

RURAL DEVELOPMENT SERIES

No. 2

POULTRY IN INDIA

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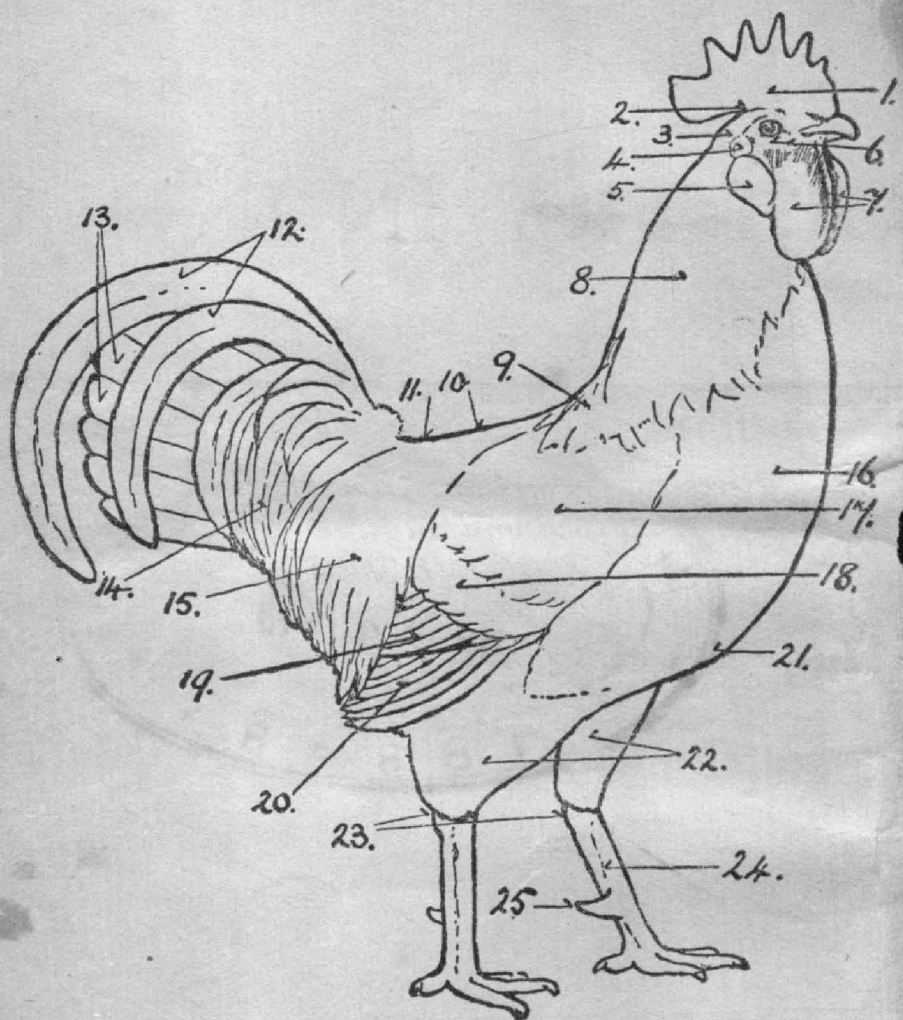
MADRAS BANGALORE SECUNDERABAD COLOMBO

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POINTS OF THE FOWL



1. Comb ; 2. Base of Comb ; 3. Cap ; 4. Ear ; 5. Ear-lobe ; 6. Face ; 7. Wattles ; 8. Hackle ; 9. Cape ; 10. Back ; 11. Saddle ; 12. Sickles ; 13. Main Tail Feathers ; 14. Tail Coverts ; 15. Saddle Hackle ; 16. Breast ; 17. Wing-bow ; 18. Wing Coverts ; 19. Secondaries ; 20. Primaries (or Flight Feathers) ; 21. Point of Keel-bone ; 22. Thighs ; 23. Hocks ; 24. Shank ; 25. Spur

NOTE BY THE AUTHOR

WHAT? . . . Poultry in India? The smiles that used to greet the question . . . 'Let me see a show of hands of those of you who have chickens in your home,' clearly betrayed the attitude of the average villager and confirmed the frank opinion of one man who said, 'Let the women putter around with a few hens if they like.' But the idea that we men should take an interest in keeping better fowls . . . 'No thank you.' 'We have bigger fish to fry . . . we cannot be bothered with hens' was the attitude of the Director of Agriculture and other Government Officials when I suggested poultry improvement in 1920.

'The early Missionary brought us the dignity of an education—Elementary schools ; High schools ; Colleges ; Universities ; Training institutions. They gave us medical work to care for the sick and needy and brought the Gospel to build the Church. It is through such efforts that we have been lifted up socially and redeemed from the degradation of village life. Now what is this nonsense of an agricultural missionary and his chickens and rural reconstruction trying to push us back into the filth and drudgery of the village?' 'The very idea, taking a special course in chicken raising while on furlough and spending hundreds of rupees to bring a few hens to India! How can such expenditure be justified?' Arguments such as these were not all confined to the privacy of so-called Indian leaders' homes. I have frequently been

hailed as the 'Chicken Missionary,' sometime in good-natured fun but often in contempt and derision. Yet in spite of it all our faces have been set as a flint for 22 years in an attempt to answer the question 'Poultry in India?'

Never once, in spite of many difficulties and discouragements, have we wavered in our resolve to pioneer and work with what India regards as the lowly fowl. We are convinced that poultry in the aggregate has a very vital contribution to make to India's economic problem, particularly that of the poorest class of society among whom the major portion of our work has been concentrated. We have been baffled times without number in making village economic surveys among such groups, to note how many managed to exist, let alone live. What contribution could we possibly make to secure some relief? The story of Jesus, how he met a situation, comparable at least to some extent, in feeding the five thousand who crowded around him (Luke 9: 10-17) has repeatedly been our inspiration and help. The disciples too were baffled and confused. How could they feed so many under seeming impossible conditions? 'Send them away' was their solution. The easy way—do nothing—run away from the problem. Utter futility. 'What are these among so many?' But these answers did not satisfy the Master—'Make them sit down.' 'Give ye them to eat.' Do something—Action—Help—Relief!

In our sincere desire to bring some little help and relief to India's poor, under-nourished, socially and economically depressed, have we in a measure found at least a partial answer to the questions found in this little booklet and many others which space does not permit us to enumerate. Many of these problems have been taken

from our correspondence files of the past years. A number have been dealt with experimentally in operating our sizable breeding plant and demonstration unit for the past 20 odd years. They have been well tested in the crucible of actual experience day after day and year after year. We are not expounding literary theories but experimental facts. We have passed on all information and experience freely, holding back nothing from the hundreds of students who have attended our poultry classes. We are not foolish enough to believe that poultry-keeping is THE way, THE ONLY way and that, if followed, will lead to Utopia. Not at all. But we are convinced that it is one of the ways to help India's poor and make possible a better diet and bring in some weekly cash to purchase family needs.

I wish to acknowledge my deep gratitude to Dr. J. L. Goheen, American Mission, Sangli and Mr. J. B. Macdonald, Imperial Poultry Research Institute, Izatnagar, for checking the data in the MSS. and for offering some very useful suggestions, many of which have been incorporated in the material.

We now pass on this information in printed form to a wider circle with the hope and prayer that others may find the information helpful, particularly those, who, like ourselves, will use it not primarily for personal aggrandizement but to help the needy and poor in India. If it serves this purpose even in a small way our objective will have been accomplished.

KATPADI,
Feb. 26, 1943.

J. J. DE VALOIS.

I. POULTRY IN GENERAL

Is it true that India is the original home of the fowl ?

It is generally conceded that the jungle fowl (*Gallus Bankiva*) found in India is the original parent of the modern fowl. A pair exhibited at a recent World's Poultry Congress attracted much attention. The Asil and Indian game are still distinctive breeds of importance. Cock fighting, though prohibited, provides sport in rural areas comparable to horse racing in urban centres.

Unfortunately, however, India has done little to improve the domesticated utility bird, so that importations are being made from abroad at present to improve India's fowls. But the very fact that fowls originated here should assure us that they should do well with proper care and management and that the poultry industry should have a big future in India.

Is poultry keeping in the Madras Presidency of any sizable importance ?

When the foundation of the Mission Poultry Farm, Katpadi, was laid in 1920, many leading Government officials laughed at us saying in effect, 'Why bother with chickens?' Nothing had then been done with poultry by the Madras Government and very little by Missions or private individuals in South India. But, the past 20 years has shown real progress and the future looks a great deal more promising still. The Agricultural Department has opened a good poultry section. The Provincial Marketing Officer in 1939 made a survey on the marketing of eggs in which the following facts are found:—

'Madras has 316.3 lakhs or 18½ per cent of the total number of fowls in India.'

'Ducks in Madras (166·8 lakhs) represent 81 per cent of India's duck population.'

'The estimated value of the total poultry in Madras Presidency is Rs. 1·4 crores as against Rs. 7·6 crores for the whole of India.'

'An estimate based on the few places where improved laying pullets and hens are kept, is roughly of the order of 15,000.'

Is the keeping of poultry in India worthy of being classed as a 'Poultry Industry'?

I am afraid that few people in India as yet realize the importance of this branch of the live-stock industry, and I am sure fewer still appreciate its potential value for the future. The hen, together with the pig and the goat, has fallen into the 'Untouchable' category and some one needs to come forward and re-christen them as 'Harijans' or 'Creatures of God' or something to elevate their economic status. The following statements may be a stimulus in this direction:

WORLD'S DUCK POPULATION

		<i>In lakhs</i>	<i>% World's total</i>
China	...	567	62·1
India	...	166	18·2
Europe	...	122	13·4
Burma	...	20	2·2
Other Asiatic Countries	...	25	2·8
North and Central America	...	7	·8
Africa	...	5	·5

WORLD'S FOWL POPULATION (*Leading Countries*).

		<i>Total fowls by lakhs</i>	<i>% of World's Total</i>
China	...	5,880	35·6
U n i t e d States of America	...	4,261	25·8
Europe	..	3,419	20·7
India	...	1,732	10·5

(International Year Book of Agriculture Statistics,
Rome, 1936-37.)

**What effect has the War and food shortage had upon
poultry raising in England ?**

'Necessity is the mother of invention,' says an old proverb. Industrial-minded England has been rudely shaken from her smug, complacent attitude toward agriculture. After two years of the present War, it is reported that there are over a million amateur poultry-keepers, averaging 12 hens each. Outside of the American Embassy in the middle of Grosvenor Square, London, a chicken farm is kept. All over the City, Londoners are awakened daily, not by the 'blitz' but by the sound of early cock-crowing. After World War I and the collapse of the economic system in Germany, the Government laid out small gardens and poultry plants on the outskirts of Berlin, Cologne and other large industrial centres. Workmen in these cities built small huts on these sites and spent their week-ends and vacations raising vegetables, keeping small poultry plants and a goat, pig or cow to meet the family food problem. It was most interesting for us in 1920 and again in 1928, to

visit these well laid out family plots. In many cases city dumps and waste land had been converted to this economic use and played a great part in the rehabilitation of Germany. 'What if India could get such a vision' was my reaction as I saw these places. How can we inspire India to 'go and do likewise?'

When and where were some of the early attempts made at improving poultry in India ?

So far as I have been able to ascertain the facts, the earliest attempts to improve the poultry industry in India were made by certain Missionaries and by interested civilians. It was later taken up by various Provincial Governments who built on the foundations laid by these early pioneers. Missionaries particularly, working with the depressed classes and the poorer people, seeing scrub poultry kept by those among whom they worked, began to import pure bred fowls from America, England and Australia in order to improve the local breeds. Some civilians, Zemindars and Maharajahs followed their example but not to the same extent nor with the same motive.

The following were some of the earliest pioneers :

Mr. A. E. Slater, Mission Poultry Farm, Etah, U.P. (1912).

Mr. J. L. Goheen, West India Mission, Sangli, S. M. C. (1916).

Mr. J. J. De Valois, Mission Poultry Farm, Katpadi, S. India (1920).

Mr. K. T. Paul at the various Y.M.C.A. Centres started under his leadership, notably Ramanathapuram and Martandam.

The American Baptist Mission at Nellore and Kurnool by the Revs. L. T. Smith and B. J. Rockwood.

Mr. A. C. Bullmore, Madras (1915).

Col. Tyrell in North India.

Dr. Tagore at his Ashram at Bolpur, Bengal.

What has been the development of poultry work sponsored by Government agencies in India ?

In 1919 Mrs. Fawkes was brought out from England to organize the United Provinces Poultry Association at Lucknow, U.P. Students for various Provincial Governments were trained at this Centre and in the succeeding years work was begun under Government auspices in various places, i.e., in the Punjab in 1922 ; Bihar and Orissa in 1924 ; Madras at the Agricultural College, Coimbatore, and at the Hosur Cattle Farm in 1924. The Mysore Government, with the help of Mr. L. B. Losey of the Seventh Day Adventist Mission, Krishnarajapuram, at Hebbal in 1934. The I.C.A.R. sanctioned a scheme for the improvement of poultry for the Bombay Government in 1935 under the management of the late Mr. E. J. Bruen who worked in co-operation with Mr. Fairbank of the Vadala Mission and Mr. Moomaw of the Mission Vocational School at Ankleshwar, both in the Bombay Presidency.

Of recent years progress has been more rapid. A central poultry section at the Imperial Veterinary Research Institute, Izatnagar, was opened in 1939 with Mr. A. J. Macdonald in charge. Its object is to carry out investigations in all branches of production including disease control and marketing. Most, if not all, Provincial Governments now have separate poultry departments,

model farms or breeding centres for the distribution of eggs and stock. The Development Department of the Madras Government has given our Katpadi Mission Poultry Farm organization a subsidy for the introduction of poultry into the villages as a part of its Rural Development program. Imperial and Provincial Marketing Boards are also beginning to encourage the work by helping in the marketing of eggs and poultry. A new day is beginning to dawn for the poultry industry in India but we still have a long way to go to get it on a footing comparable with Western countries.

What other factors have helped to promote the poultry industry in India ?

The Indian Poultry Club was organized many years ago and its official organ, the *Indian Poultry Gazette*, was published as a monthly magazine. This Club, as well as the magazine, had a very checkered existence of 'on again, off again' through the years. It has recently been reorganized and the Gazette is now a quarterly journal sponsoring poultry interests. There have been all too few qualified persons who have had the time or the interest to promote these ventures which are so essential to give adequate publicity and information to the public.

The All India Poultry Show held in various Indian Centres the past 15 years has also brought the value and the possibility of keeping pure-bred fowls before the public. The interest that has been shown by the general public has, however, been rather disappointing, which has made it difficult to maintain the work.

The South India Poultry Association has sponsored several shows in South India the past few years but its activities have been about as sporadic as those of the Indian Poultry Club. Very little financial support has been given to these ventures from Government funds.



The importation of blooded stock from abroad has been another means of promoting interest and enthusiasm. The Mission Poultry Farm, Katpadi, for example, has imported 75 W.L., R.I.R., Barred Plymouth Rocks, Black Australorps and Light Sussex fowls and Mammoth Bronze Turkeys of the best stock procurable in America, England and Australia. Many other breeders and fanciers have also made importations so that some very fine poultry blood has been introduced into India as foundation material.

The Co-operative Department of the Madras Government from December 1942 is giving our Katpadi Co-operative Egg Marketing Society Ltd. a subsidy of Rs. 50 per month to facilitate the collection of improved eggs from villages where graded stock is being raised. The object is to use one such area as a demonstration centre for improved poultry work of this nature.

The above are a few of the ways in which poultry activities are being encouraged at the present time but we need to enlist the interest and co-operation of many more to bring India's poultry industry to its rightful place of importance.

How should an Amateur begin poultry farming ?

I would lay down a few basic principles such as :—

1. *Begin on a small scale. Learn as you progress :* Scores of people make the mistake of starting big, thinking it a sure way to 'get rich quick'. I have yet to find such a person who made a success of the venture. Many lose not only their money but also their enthusiasm and then become a menace to the industry by discouraging others.

2. *Start with good stock :* Fowls are very prolific and can with good management be multiplied a hundred or a thousand fold in a very short time. It is a wiser policy, therefore, to pay Rs. 50 for a well-bred trio from a reliable breeder, than to pick up a dozen or twenty-five birds of unknown parentage and breeding and try to have a big show all at once.

3. *Keep only one breed.* If you want to start a zoo or menagerie, then, of course, get as many breeds as possible so as to have something of everything. But too many people try to do this when attempting poultry farming and end up by having nothing of anything. This is a very common mistake among our friends in India and if my advice is worth anything heed my 'Beware lest ye fall into this temptation'.

4. *Always breed to a pure-bred cock :* Observe this one principle and no matter what hens you start with, you are sure to have a good poultry project in a very short time. Always buy a good male! Beware of getting something cheap !

5. *Take time to learn the business :* Agricultural Colleges in the West know that a 4-year degree course in

Poultry-Husbandry only lays the foundation for later post-graduate specialization in one particular branch of the Poultry Industry. One does not need to be an expert to keep a dozen or a hundred fowls, but do not deceive yourself into thinking that anybody can succeed. It takes experience, business-like methods and careful study and supervision to make a success. Therefore get all the competent advice you can.

Is it possible to make a living from poultry farming?

In America and Europe thousands of farmers make a good living from poultry breeding, hatcheries or table egg production. In India this is not so easily done because of the uncertainty of epidemics and lack of organized markets. We advocate the keeping of poultry as a subsidiary or secondary source of income, first of all to improve the diet of the family and secondly to sell eggs and birds for a cash income to subsidize the main source of family support. Many teachers and professional people as well as farmers and labourers are keeping fowls in this way. We recommend the keeping of fowls, like keeping a kitchen garden, as a permanent hobby or as an aid in a 'Grow More Food' campaign.

What is the purpose of an 'egg laying competition' and how is it conducted?

Egg laying competitions are conducted in various countries, usually under the direction and control of the Agricultural College to determine the comparative egg-laying capacity of birds from various breeds and breeders. The object is to stimulate interest in the rearing of better and more productive poultry.

The first organized laying contest is reported to have been held in England in 1897 and this example was followed later by Australia, Ireland, Canada, Poland, the Union of South Africa and other countries. The first competition in America was held at the Connecticut Agricultural College at Storrs in 1911 and has been a yearly feature ever since. These contests extend over a period of 51 weeks, beginning on October 1 each year. Thirteen hens are entered as a pen. No replacements are permitted so that if one or more hens die the pen must complete the year with a lesser number. All birds are fed on the same ration, housed and cared for under identical conditions and treated exactly alike for comparative purposes. Each hen is individually trapnested and the eggs scored for size allowing .7 of a point for each egg of $1\frac{1}{2}$ ounces compared with 1.1 points for eggs grading 26 oz. per dozen. In 1940 the winning hen was a Rhode Island Red having laid 341 eggs in 51 weeks.

In 1940 America had 16 competitions conducted in various sections of the country with an enrolment of 14,500 hens. Breeders are very keen to win prizes for their entries at these contests because it promotes better sales for their stock.

In 1920-21 the U.P.P.A. conducted the first competition of this kind in India at Lucknow for a period of 92 days. There were 119 entries, 18 birds having been imported for the purpose. The highest record was 69 eggs laid by a W. Leghorn hen. Those of us who are interested in promoting the poultry industry in India are very sorry that this feature started so bravely by the U.P.P.A. has not been continued. Nothing can be a greater stimulus to utility poultry farming than well-

conducted competitions of this kind which place a premium on birds bred for high egg yield, strong constitution to stand up under this strain and large egg size, all three of which make for profitable poultry farming.

What is meant by the term 'Commercial Hatcheries'?

In America and Europe, thousands of poultry farmers no longer hatch their own chicks. They buy all their requirements for the year in one lot, be it 50 or 10,000 as 'day-old chicks' from a hatchery that specializes in the incubation of eggs by means of Mammoth incubators. Many hatcheries having a capacity of over ten lakhs of eggs at one setting and hatch from 20,000 to 30,000 chicks a day during the hatching season of from 3 to 5 months a year. The manager of such a hatchery contracts with poultry farmers in the community to supply him with fertile eggs, at the rate of 25 per cent or 50 per cent above the price of table eggs. The hatchery itself usually has its own poultry plant as well and supplies egg producing customers with breeding cocks. These farms are subject to Veterinary inspection and are controlled by Government regulations to insure healthy stock. The day-old chicks are shipped far and wide, taking advantage of the fact that they need not be fed or watered for at least 36 hours. The hatchery business is an industry organized into a National Federation for the mass production of chicks. Almost every village, in the large poultry producing areas of America, has its own commercial hatchery. A village near my old home in America produces 6,000,000 chicks a year. Day-old chicks are sold in large numbers in the 5 and 10 cent stores during the spring months.

Is there any place in India where such hatcheries are operating even on a small scale ?

The 1938 report of the Marketing of eggs in India says—‘There is practically no trade at all in India at present in day-old chicks’. The Mission Poultry Farm, Katpadi, in this as in many other aspects of Poultry Farming, has been the pioneer in India. We have been operating incubator capacity of over 1,000 eggs for the past 5 years and shipping hundreds of day-old chicks all over India with success. We are



‘HERE AM I;
SEND ME.’

attempting to educate the public to take our advice and buy their poultry needs in this way. The business is growing every year as people are learning its advantages. I know of no other poultry farm in India that is attempting to popularize this practice, although some no doubt would be willing to accommodate their customers by supplying chicks instead of hatching eggs. We are in a position to do this business because we usually have up to a thousand of the best pedigreed birds from imported stock on our own farm, supported as well by hundreds in the villages. India, like Western Countries, will eventually be converted to the practice of buying day-old chicks instead of getting hatching eggs.

What fundamental rules would you lay down to a novice beginning a village poultry project ?

1. Get away from the village at least 200 yards or more. Locate your project in a tope near your fields and obviate the impossible crowded village conditions. It

will take many years of patient effort to build up enough co-operative spirit in the average village to warrant successful poultry rearing there.

2. Make a small beginning with good birds.

3. *Always* breed to a pure-bred cock of known pedigree.

4. Ultimately, keep at least 25 laying hens so that it will pay to take the same interest in fowls as is taken in other farm crops. No farmer would bother to care for a 10' by 10' paddy field. Neither will anybody consider one hen and one cock worth looking after.

5. Stick to it! Do you intend to make this a 24 hours a day, 365 days a year job, for at least a 5-year period? If not, please never start.

What is the largest poultry farm of your acquaintance?

The largest single poultry plant I know of is the Runnymede Farm near Los Angeles, California, where 400,000 birds are kept. I know of another 28-acre farm where 3,000 turkeys are being raised each year, killed, dressed and sold in the retail market.

There are a number of such specialized farms in America particularly on the extreme East and West coasts. However, the vast bulk of poultry is still kept on the general farm in flocks averaging from 50 to 200 birds and considered a subsidiary project rather than the main source of income. Iowa, my native State, leads the American poultry industry in this way. We recommend the same idea to India. Introduce poultry as a side line instead of looking to it for a complete livelihood.

II. BREEDS AND BREEDING

What are the best breeds for South India ?

One cannot be dogmatic about such a matter, but our 20 years experience leads us to feel that the lighter breeds such as White Leghorn, Black Minorca and Rhode Island Red do best on the plains. We would only recommend the heavier breeds such as Barred Plymouth Rock, Light Sussex, Orpingtons, Australorps and Wyandottes for the hills. It also depends on the purpose for which fowls are to be kept, the above applying largely in consideration of egg production.

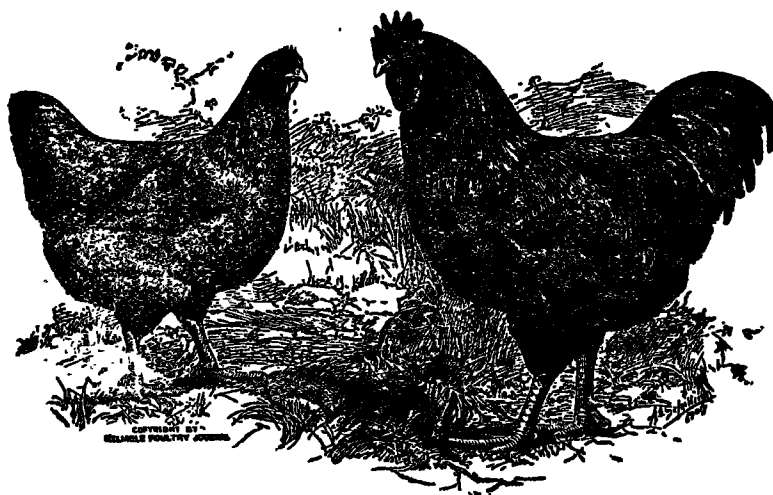
What is a reasonable price to pay for good breeding stock in India ?

The best birds have to be imported because India to date has not developed a good indigenous breed of its own. *Highly pedigreed birds worth shipping 6,000 or 12,000 miles, are costly to buy and transportation expenses are heavy.* Consequently, good breeding stock in India is expensive and one should not grudge to pay Rs. 15 or even Rs. 25 for a really good bird. Some reliable poultry breeders will sell stock at times for Rs. 5 or Rs. 10 each. *Always* be sure of a good male bird. You are not likely to pay too much for him. He is half your flock. Or, buy day-old chicks from a reliable breeder and get a good start in the cheapest way possible.

What is meant by utility poultry breeding ?

This term applies to the breeding of birds largely from the standpoint of egg production or table birds or a combination of the two. Usefulness and productiveness

are emphasized rather than appearance and beauty as is required in a poultry show. Some breeders stress exhibition qualities, such as colour, markings and type, sacrificing production if necessary to get a beautiful bird for the show ring. A combination of the two purposes is usually the objective to strive for although specialists choose either the one or the other.



What is the best breeding season in India ?

Our experience is that eggs are most fertile in the rainy months when grass and insects are most plentiful. But in order that chicks may be of good size before the chicken-pox season at the beginning of the hot weather in March, we hatch from May to December. The earlier hatched chicks usually do best, developing at the time when green grass, white ants, and poochies are most

plentiful. Early hatched chicks also mature before the hot weather, which is desirable. But, it is always a task to get good fertility and hatchability from the breeding pens so early in the season. Abundant green feed or sprouted grain must be supplied.

How soon after mating will eggs be fertile ?

From 4 to 10 days as a rule. If a hen has been mated with a male from another pen, her eggs should not be used for breeding until 20 days have passed to make sure of the pedigree.

What is meant by 'Cross-breeding' ?

Strictly speaking, cross-breeding is the mating of a cock of one pure breed with females of another pure breed, i.e., W. Leghorn $\times$ Rhode Island Red. This is the method by which the many different breeds originated. After the colour, type or other characteristics have been partially attained, selections of such birds are made and bred pure until the desired features have been fixed and established as a distinctive breed or variety.

What is 'Hybrid Vigor' ?

When two pure-bred breeds of fowls or animals or strains of grain are crossed, the first generation offspring will be larger, stronger and more vigorous than either parent. This is known as 'Hybrid vigour'. It is used extensively by poultry farmers who keep hens only for egg production. But, these cross-bred fowls are as a rule not used for breeding because the desirable characteristics tend to break down in the second and succeeding generations giving offspring of unpredictable value, often little better than culls. For example, pure-bred

Leghorns mated with pure-bred Black Minorcas produce a bird we call 'Legorcas', which are very strong, and vigorous, producing large eggs and many of them. In 1940, 436 of these new hybrid pullets in America are reported to have averaged 46 per cent more eggs than an equal number of pure breeds handled under the same conditions. In addition the hybrid pullets showed higher livability, matured earlier, and produced larger eggs. This is in accord with my personal experience in dealing with hybrid stock and grains. But, hybrid birds of this type should only be used for table egg production and not for breeding as a general rule.

What is meant by 'in-breeding', 'in-and-in-breeding' and 'line breeding'?

In-breeding is the promiscuous and haphazard breeding of closely related birds or animals. This system, so much practised in the villages, tends to the deterioration of stock in size, productiveness, fertility and resistance to disease.

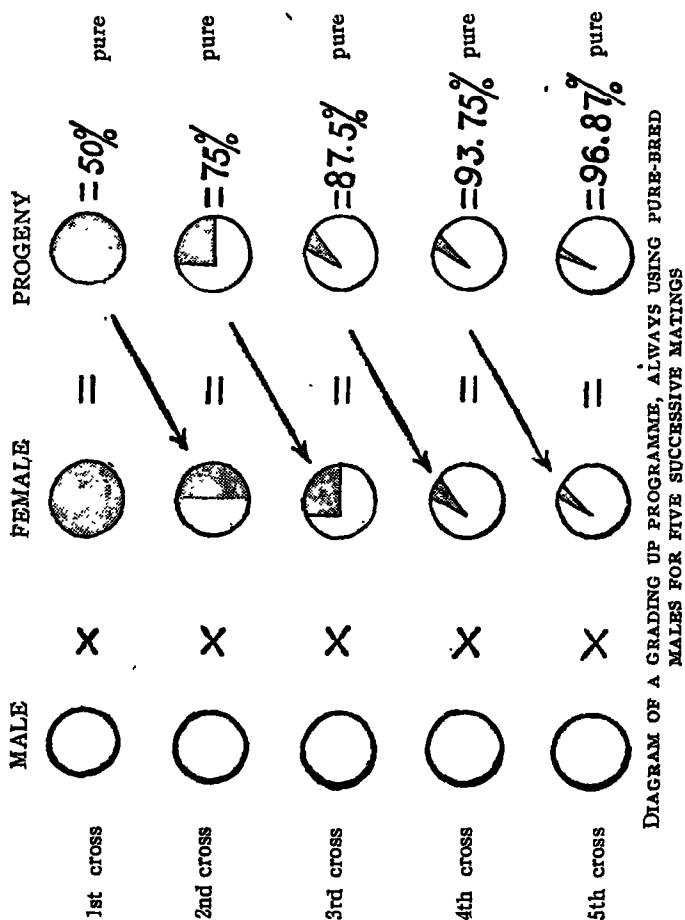
In-and-in-breeding is the mating of brother and sister and should always be avoided.

Line breeding is a systematic and carefully worked out programme which experts use in mating closely related birds. In this way the progeny will all carry the blood lines of one family or individual. Only experts should attempt such a programme because faults and weaknesses as well as desirable features tend to be multiplied.

What does the term 'grading' mean in poultry breeding?

The mating of pure-bred cocks to mongrel hens or those of unknown ancestry produce offspring known as

grades If the cockerels are all destroyed and the pullets mated to pure-bred males for five generations, the result will be birds carrying 96.87 per cent pure blood. If



a man has some country hens for example and he uses pure-bred White Leghorn males for 6 successive

generations, he will have a flock of White Leghorns as good as pure breeds for all practical purposes. This is the cheapest way to get a good flock of birds established. (Note chart.) Observe two simple rules only:—

1. Always breed to a pure-bred cock.
2. Always dispose of *all* the cockerel chicks hatched even if they look like good birds. This is our basic policy in introducing better fowls into the villages. Many cross-bred pullets lay almost as well as pure breeds. At the U. P. P. A. some years ago, a first cross Leghorn pullet laid 61 eggs in 66 days. The size of egg is also increased considerably in most cases. This is the poor man's way to get a good flock of chickens.

How are so-called 'strains' or 'family lines' or new varieties produced?

By the scientific use of line breeding, crossing, grading and selection. 'Given time,' said a famous breeder, 'I will produce a lap-dog from an elephant.' Scientists to-day are producing hens that lay coloured eggs, chickens with almost all white meat or with big drumsticks or a family size turkey. But, it may take 40,000 different crosses before the goal is reached. The Rhode Island Red breed of fowls for example was produced in America by using the Cochin, the Brown Leghorn, the Malay and Wyandotte breeds. After a certain colour and pattern had been established it was further fixed by years of careful selection and recognized as a special breed in 1904.

The Orpington was produced in England by crossing the Minorca, Black Rock and Langshan. Breeders in Australia made further selections from the

pingtons, stressing utility factors, and finally named them Australia-Orpingtons or Australorps.

We desperately need such research workers in India to develop satisfactory indigenous breeds of poultry. Something is being done but nothing compared with the challenge that comes. India is the home of the original fowl and still has some fine specimens. If patience time and effort were taken some very good breeds could be evolved by selection and scientific work. We are particularly in need of more concentrated effort in combating the diseases of fowls still so rampant in this country.

What is sex-linkage ?

This is cross-breeding pure-bred fowls so that cockerel and pullet chicks can be distinguished upon hatching. This is used extensively in the 'baby-chick' industry whereby customers can buy pullet or cockerel chicks as per choice. The male and female chicks will be of different colours or have some identification mark. For example, if Plymouth Rock females are mated to a Rhode Island Red male, the female chicks will all be black with dark beaks and shanks and cockerel chicks will have a white spot on their heads and have yellow beaks and shanks. Upon maturing the pullets will be black and the cockerels barred like the mother.

In Light Sussex females $\times$ Rhode Island Red males, the pullet chick will be buff coloured and the cockerel chicks cream or white. Upon maturing, the pullets will be buff and the cockerel chicks take on the colour pattern of the mother. Similarly Black Minorca males $\times$ Barred Plymouth Rock females gives the black-barred sex linked cross.

With how many hens can a vigorous cock be mated with success ?

That depends a good deal on conditions. In the lighter breeds such as White Leghorn and Black Minorca, up to 15 hens or pullets can be mated with one cock, about 12 or 13 in the medium weight breeds such as Rhode Island Red and Light Sussex, but ordinarily, only about 10 hens should be given to a cock of the heavier breeds such as Australorps or Orpingtons. If one has a very valuable cock and if he is kept confined and mated individually on alternate days, he can be used satisfactorily with 30 hens. Some breeders having a very vigorous and valuable male bird may keep 30 hens in 3 separate runs of 10 each and mate the cock with such pens on successive days in rotation. Satisfactory results have been obtained by this system and a valuable bird is used to the maximum of his capacity. This, of course, requires considerable time and must be done by a trustworthy man, or infertile eggs will result. In conducting experiments at the Beltsville Research Centre, U.S.A., it has been demonstrated that a valuable male can fertilize from 100 to 200 hens by artificial insemination with a one c.c., 25 per cent semen solution. Of course, this is only practicable if done by experts but indicates the potential potency of a good male.

What is the relative advantage of the so-called light, medium and heavy breeds ?

The light breeds mature early and because of their smaller size eat less. They are also very active birds

ranging far and wide to find their feed. They are good layers as a rule but are discounted as a table fowl because of their small size.

The heavy breeds mature more slowly, having to be fed 2 months longer than light breeds before coming into production. They are slow and phlegmatic, easy to keep in a pen but poor rangers for finding their feed. They are usually valued as table birds because of their large size, but poor layers as a rule.

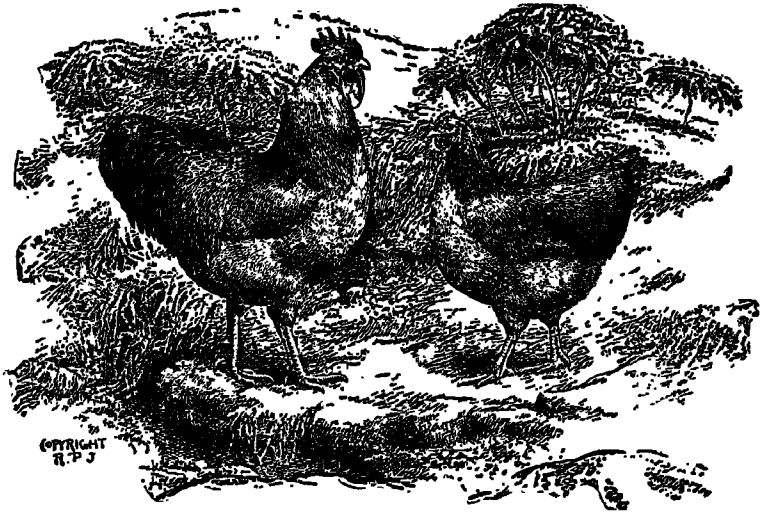
The medium breeds are the middle-of-the roaders, midway between the two.

Our experience of over 20 years leads us to feel that the lighter breeds—White Leghorn and Black Minorca—are best for the plains of India, although the Rhode Island Red too has done very well, especially in the villages where it is a strong favourite. The heavier breeds are preferred by many in hill stations where some claim they stand the climate better than the light breeds. We have tried many breeds at Katpadi and have found the White Leghorn, Black Minorca and Rhode Island Red best for our conditions.

What is a capon ?

A capon is a desexed male fowl. Cockerel chicks can best be caponized by a fairly simple operation when about 6 weeks old. Capons do not breed, crow or fight. The comb and wattles do not develop. Only the larger breeds such as R.I. Red, Barred Plymouth Rock or Light Sussex make suitable capons. We caponize village cockerels to prevent their breeding and interfering with the grading process we follow in mating pure-bred cocks with desi or cross-bred hens. Capons grow faster

than cockerels and their meat is a real delicacy, demanding a good price on the market.



PLYMOUTH ROCKS
A POPULAR AMERICAN BREED

‘I am given to understand that in your poultry, there are fowls whose feather is white and soft but whose beak, legs, flesh and blood are black and a bit smaller in size than the ordinary fowls. I have a great desire to bring up this fowls and shall feel highly obliged if you will kindly let me know the cost of one pair.’

The birds you refer to are ‘Silkies’, a breed with a dark blue skin and soft feathers like silk. They are very small, classed as ‘Bantams’. This breed is highly prized by many people in India for the medicinal properties the meat and blood is claimed to have, particularly for paralytic patients.

What are some of the more important classifications of the various breeds of poultry ?

These may be arranged by the country of origin as follows:—

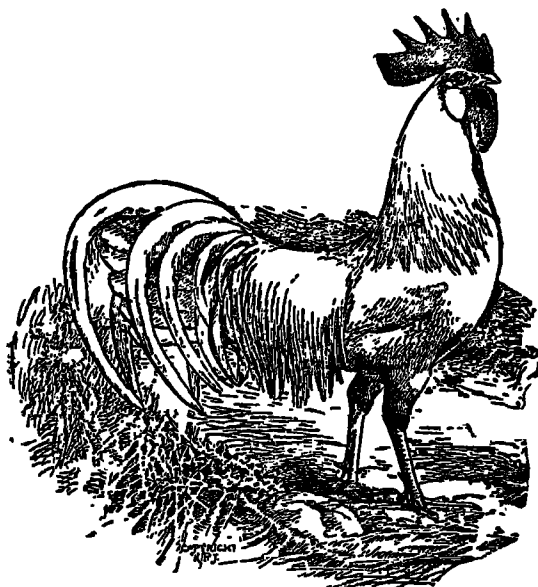
1. American class—Plymouth Rock, Rhode Island Red, Wyandotte.
2. Asiatic class—Brahma, Cochin, Langshan.
3. English class—Orpington, Sussex, Australorp.
4. Mediterranean class—Leghorn, Minorca, Spanish.
5. Continental class—Wellsummer, Polish, French breeds, Hamburg.
6. Ornamental breeds—Bantams, Silkie, Frizzle.
7. Game birds of various breeds.

In addition to the above, there are many classes within a breed according to colour, i.e., White, Black, Barred, Buff, Brown and according to the shape of comb, i.e., single, rose, pea, strawberry, etc.

What is the average annual egg production of hens in India ?

The average hen in India lays three clutches of eggs per year with from 10 to 20 eggs in each cycle. A liberal estimate of from 30 to 60 eggs is, therefore, generally conceded. This is about half of that reported in many other countries where 100 to 120 is the average laying capacity. Poor stock, lack of proper feeding, bad housing and careless management are contributing causes. The average villager really does not raise or keep fowls. They just happen. Very little feed is given. They scavenge around the village and pick up what is to be found. It is a haphazard affair. But the bulk of

India's fowls for decades to come will doubtless be raised in small numbers in village homes and if material progress is to be made, something must be done to improve these projects as well as the larger establishments giving



WHITE LEGHORN COCK

more specialized attention to chickens. It is a colossal task but its magnitude should not stop us from doing something, and at once !

What is the highest laying record you have found in India ?

In 1940 we were working our Farm on a joint basis with the Lovedale Poultry Farm located on the Yellagiri Hills, Jalarpet, at a very fine 3,000' altitude. A pen of White Leghorn birds was imported from the

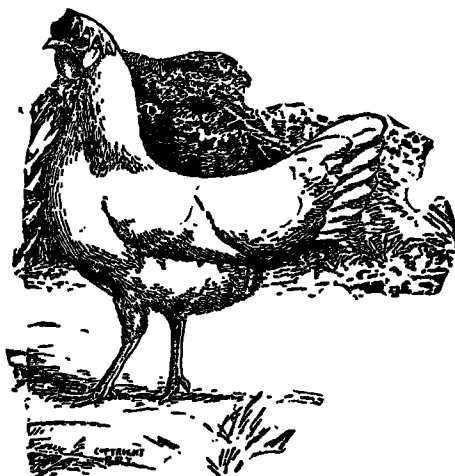
State of Washington, and the following is the monthly record of 2 pullets in their first year :—

MONTH	DAYS	HENS	
		No. 229 <i>Eggs</i>	No. 402 <i>Eggs</i>
July	... 31	27	20
August	... 31	27	27
September	... 30	27	27
October	... 31	28	27
November	... 30	30	29
December	... 31	29	28
January, 1941	... 31	29	28
February	... 28	27	24
March	... 31	30	29
April	... 30	29	28
May	... 31	27	27
June	... 30	26	24
Total	... 365	336	318

This is the best record I have seen listed in India and gives an idea of what can be done under ideal conditions. We still have the 2 hens and they are laying well in their third year. Their offspring too are doing very well. Get breeding stock from families like these!

How many eggs do you consider a good hen should lay in one year in India ?

We consider 180 to 200 eggs a year for the flock average very good in the west. In India we may expect 150 eggs a year from a good hen. The following are figures the Hosur Cattle Farm and the Agricultural College



WHITE LEGHORN HEN

Coimbatore, list as their average production for the year:—

	<i>Hosur</i>	<i>Coimbatore</i>
White Leghorn	... 177	165
R.I. Red	... 137	160
Lt. Sussex	... 126	140
Black Minorca	... 122	...
Chittagong	... 101	...

The flock average at Hosur was 146 eggs in 1938 but has been as high as 166.9 eggs average for their flock. The best hen, a White Leghorn, laid 212 eggs last year at the Agricultural College, Coimbatore, and a R.I. Red 190.

The 'American Poultry Record' gives some official egg production records of from 350 to 361 in a year as the highest official trap-nest records. The egg a day bird asked for by some people therefore is still not a reality. Only very skilled breeding and management is able to produce the so-called '300 eggers

III. FEEDS AND FEEDING

What is meant by a balanced ration ?

A balanced ration for fowls is one with the various feeds mixed or given in such proportion as to give the maximum results in eggs or body growth. Agricultural Chemists go to great trouble to analyze eggs and those elements required for body development and mix feeds accordingly. We know for example, speaking in general terms, that a hen must have one lb. of digestible protein to make the whites for 16 eggs. Then to produce the necessary 16 yolks, she needs 5 lbs. of digestible carbohydrates and fats. If the feed is mixed in this proportion we have a balanced ration for egg production.

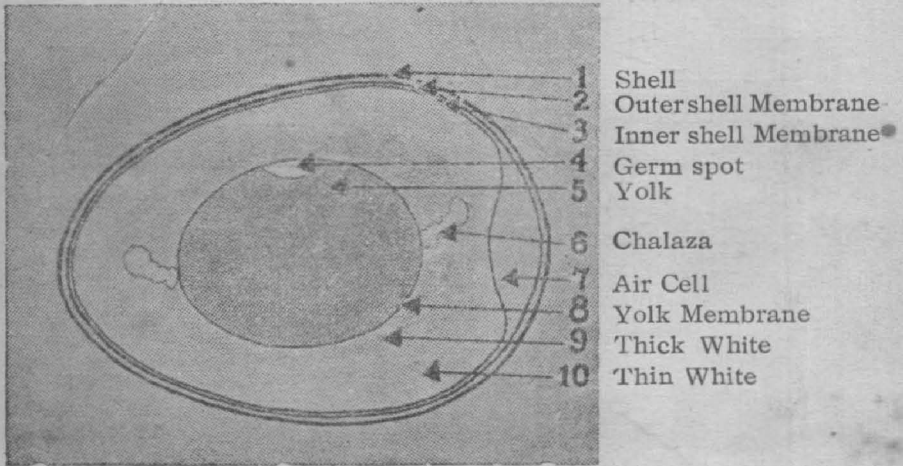
What is the best diet to feed my fowls ?

There is no such thing as a 'best diet'. A number of combinations of suitable foodstuffs can be made. Any palatable diet that supplies an adequate amount of the necessary nutrients in the right proportion can be said to be a good diet. Cost, availability and local conditions are all factors to take into consideration. The diet must supply adequate quantities of carbohydrates, fats, proteins minerals and vitamins. Since feed constitutes at least 60 per cent of the expense of keeping fowls, it is very important to see that proper attention is given to this factor.

Why is a hen sometimes called an 'egg factory' ?

The laying of large numbers of eggs is one of the primary functions of the modern, domesticated hen. She

has been bred for this purpose. But to do this she must have the raw materials from which to make eggs. A weaver, for example, must have the warp to weave his cloth. If he is given 25 yards of warp he can only make 25 yards of cloth. Even though he may have hundreds of yards of yarn to spare, these are of no use to him until he gets additional warp. Both warp and woof must be supplied to him in the proper proportions.



CROSS SECTION OF AN EGG

So with a hen ; she will not lay an egg unless she is given all the necessary materials for the manufacture of the yolk, white and shell. If a poultry farmer feeds enough grains to produce 25 yolks but only enough protein feeds to make 10 whites, the poor hen, although doing her best, can only lay 10 eggs. The other portion of the grain food is wasted or goes to make the bird too fat and eventually unproductive. The 'egg factory' operates at a loss but it is not the fault of the hen.

Can you give a general idea of the white and yolk producing materials in various feeds ?

The following facts taken from one of the American experimental station bulletins, gives in so far as they apply to available South Indian feeds, the approximate number of whites and yolks in a hundred lbs. :—

			<i>Whites</i>	<i>Yolks</i>
Grains—paddy, ragi, cholam and				
cumbu ...	...	...	125	254
Gram ...	...	...	309	189
Meat scraps (bottie) ...	...	...	806	87
Bone meal	...	...	195	336
Fish meal	...	...	806	87
Rice or wheat-bran (average)	...	...	210	172
Ground-nut cake	...	...	650	155
Greens (average)	...	...	31	40

One can see from these figures that it is very essential to give more than only grain, as many people do, if the hen is to return maximum results.

What are protein feeds and what is their function ?

Protein supplies material for body growth and for making the white in egg production. Animal protein for poultry feed is found chiefly in meat and fishmeal; vegetable protein in groundnut-cake and bran. It is very essential to include one or all of these in the ration both for growing birds and laying hens. It is desirable that at least one-fourth, preferably one-half, of the protein content in the diet be from animal sources, i.e., fishmeal, bonemeal, meat offal or white ants. Proteins of animal origin are utilized better by the fowl for growth and egg production than proteins of vegetable origin. —

What feeds supply carbohydrates and what is their function ?

Carbohydrates and fats are producers of heat and energy. These are largely supplied by grains of all kinds—paddy, ragi, cumbu, cholam, etc. These are very important but the common fault in feeding poultry is to supply too much of this because it is comparatively cheap and too little protein because that is relatively expensive. The result is that young stock do not grow properly and hens fail to lay up to their maximum capacity because the materials for the egg white is not in proportion to the yolk produced by the excessive feeding of grain. This same criticism holds true in human rations where polished rice is eaten in such large quantities and so little meat, eggs, milk, vegetables and fruits to balance it properly.

Why are green feeds valuable and how can they be supplied ?

Green feed is essential to supply vitamins, without which a bird may develop eye trouble and other ailments. Vegetable tops and wastage, lucerne, sunn hemp and ordinary grass or greens are all very good and must be fed generously and regularly. Green feed is also very useful in keeping up the appetite and maintaining health in general. What appear to be nutritional diseases may often be cleared up by generous feeding of greens. It is not possible to overstress the importance of providing this in poultry diets. Green feed can be secured much more easily in India than in colder countries and should be used generously, especially in feeding small chicks and breeding birds in order to secure satisfactory hatching results.

Do fowls require much water ?

Yes, very decidedly! Remember that an egg is about 66 per cent water and judge its importance for yourself. The laying of small eggs by well-bred birds has frequently been traced to a deficiency of water. In a hot country like India this is of supreme importance. Clean, fresh, cool water should always be available and in a place where the bird can get at it readily. A hen will hesitate to go out in the hot, burning sun even for a drink until excessive thirst compels her. This is very poor economy. Water is probably the cheapest item in the diet but do not minimize its importance because of this.

How much feed should I give to my birds daily ?

This of course varies with the breed of fowls you keep, their age, whether laying heavily, etc., but, roughly speaking, we figure on giving 2 ounces of grain and 2 ounces of mash per adult bird per day. The cost may be taken as approximately an anna per bird per week. (In normal times.)

The following comparative table gives the approximate amount of feed required per year by birds of various breeds:

White Leghorn	...	75 lbs. per year.
Black Minorca	...	80 "
Rhode Island Red	...	85 "
Barred Plymouth Rock and		
Light Sussex	...	90 "
Heavy breeds	...	95-100 "

What feeding schedule should I follow?

The following is what we follow at our Farm:—

Grain—about 2 oz. per bird per day; feed about 1/3 of this early morning scattered in clean sand or litter to induce scratching and exercise. The grains given are paddy, cumbu, ragi and cholam, all grown locally.

Mash—about 2 oz. per fowl per day mixed as follows and fed either dry or mixed with milk or water :

Rice-bran (best grade)	...	12 parts
Wheat-bran	...	6 „
Wheat or ragi flour	...	6 „
Charcoal	...	1 part
Fishmeal	...	1 „
Groundnut-cake	...	$\frac{1}{2}$ „
Bonemeal	...	1 „
Salt	...	$\frac{1}{8}$ „

Green feed—Lucerne-Sunn Hemp, or Radish tops finely cut. Give free range if possible.

Fresh, clean water always available. Green bones are chopped and fed as available.

The birds are let out of the pens very early and a small amount of grain is scattered through the run to make them scratch and exercise. About 9 a.m. they are given chopped green food. At 10 a.m. about half the mash ration is given in a crumbly consistency. The dry mash hoppers are open and filled all day. As the men go around collecting eggs, they see that water is available. About 3 p.m. another feed of greens is given totaling 1-2 oz. per bird per day. By 5 p.m. the final grain feed is given so that the fowls can go to bed with full crops.

Calcium is supplied in the form of shell grit or broken lime-stone always available. The birds are let out of the runs as much as possible to hunt worms, bugs and green feed. We attempt to keep the birds busy all day because a loafing hen is a slacker.

The following is the ration of the Agricultural College, Coimbatore :—

Mash—Cumbu	...	15	
Groundnut cake	...	20	
Varagu	...	10	
Ragi	...	20	
Linseed	...	5	
Mineral mixture	}	...	4 equal parts
Bonemeal and lime			
Cholam	...	5	
Rice	...	10	
Fishmeal	...	10	
Salt	...	1	

One half to one lb. of skim-milk is added to every 8 lbs. of mash if available.

Grain mixture—Paddy	Cholam	Varagu
50	50	
	or	
50	40	10

Greens—5 to 8 lbs. daily for about 70 birds.

Is it possible to overfeed a hen ?

If a hen has been bred for high egg production and if a balanced ration is fed, it is then wise economy to get such a bird to eat as much as possible. A certain amount of feed is first of all necessary for body maintenance. All feed over and above this will go into the

production of eggs so that the more she eats the better she will lay. It *never* pays to try to save money in feeding well-bred birds. Try rather to make the food as palatable and attractive as possible to induce them to eat the maximum. The last 10 or 25 per cent production represents the margin of profit as a rule.

What do you mean by the terms—‘ wet mash ’ and ‘ dry mash ’ ?

The so-called concentrated feeds such as bran, fish-meal, bonemeal, cake powder, together with some ground grains and minerals are usually mixed together. If it is fed in this way, it is known as a ‘ dry mash ’ and is often placed in ‘ hoppers ’ where the birds have access to it all the time. This saves much labour and trouble. If the feed is mixed with water or milk or possibly some cooked grains or vegetables, it is more palatable and is known as a ‘ wet mash ’. This, of course, must be fed by hand daily.

Where in South India can I obtain various poultry feeds ?

Grains such as Cumbu (Bajra), Cholam (Juar), Paddy, Ragi, Gram can be obtained locally in most places. Fish and bonemeal are sold by Parry & Co., Ltd., Ranipet, and Stanes & Co., Coimbatore. Oyster shell can be had from the Government Fisheries, Ennur. Wheat-bran is available at the Elgin Flour Mills, Bangalore, or at local horse feed stores.

I frequently get eggs with very soft shells. What is the cause ?

Your birds are not having access to enough shell forming minerals, chiefly calcium. See that grit in the

form of crushed oyster shells or broken limestone is always available and the hen will take what she needs to put shells on her eggs. Limestone, old rubble from torn down buildings and bonemeal will help in this difficulty. A small amount of very finely crushed oyster shell can be mixed with the mash if the difficulty persists. Remember that a hen in laying 200 eggs uses about 15 times as much calcium as she has in her body and you can appreciate the necessity of supplying the same in the feed of a laying bird.

A friend advised me to feed my birds certain spices to 'pep up' egg production. Is this advisable?

We never advise 'doping' or 'forcing' our birds. Feed good, wholesome, palatable, properly balanced feeds for best results. You can dope and force your birds and increase egg production for a time but trouble is sure to result in the long run. Tonics, spices and other highly advertised feeding concoctions are unnecessary and usually undesirable.

At what age should pullets begin to lay?

Well-bred, well-fed W.L. and B.M. pullets should lay their first egg at 160-170 days. Medium breeds like the R.I. Red or Light Sussex at about 170-190 days and the heavier breeds at 220 days of age. Much, of course, depends on the breeding, feeding and management but this is a guide as to what may be expected. If pullets mature very young it is well to cut short on protein feeds before they begin to lay in order to give more chance for body development.

Why do pullets lay small eggs?

Fowls usually do not reach their maximum size before they are a year old. A pullet therefore continues to grow during the first months of its laying period, and while doing double duty, as it were, is not able to do its best in laying a large egg. Patience should be exercised in allowing a pullet to develop fully before expecting its full capacity of laying large eggs.



What feed should be given to chicks?

Immediately before hatching, the baby chick absorbs the whole yolk of the egg into its abdomen. Nature has made this provision so that the chick is entirely independent of feed or water even up to 72 hours if necessary.

During the first week, feed hard boiled eggs mixed with finely chopped greens, onions and garlic. Bread crumbs are also good if available. We feed our baby chickens tins full of white-ants. How they relish them and how they grow those first few weeks! Nothing is better! Milk, butter-milk and curds too are excellent and if available, should be included in the ration to get the little fellows off to a flying start. The first month may well be the making or breaking of its future usefulness. Stunted chicks are worthless so give them your best attention. Feed often and in small amounts. Grains such as ragi, cumbu and broken rice or wheat can be fed and the size increased as the chicks grow. The mash mixture should also be fed liberally. After they are a month old, in addition to the grain and mash,

about $\frac{1}{2}$ oz. per chick of meat offal green chopped bones or fish should be added to provide the body-building materials. Keep them *humping* all the time! It pays!

What can I do to get a good eating fowl for my table?

First of all keep a good breed of birds, feed them well and there is no reason why you should not have a good table bird. The Indian game or Aseel makes a fine table fowl.

HEAVY BREED



GOOD TABLE FOWL

Secondly, table fowls should be fattened to get the best results. It is impossible to pick up a bird in the bazaar at 10 a.m. and expect a palatable chicken dinner at night as is done by most cooks. We advise that you fix up a crate about 3' x 2' x 18" for a few fowls and place this in a semi-dark godown. Put your eating fowls in this for ten days, feeding them on a mixture made up of two parts best grade wheat or rice bran, one part finely ground ragi or maize flour, mixed to a crumbly consistency with water or curds and buttermilk if at all

possible. Feed as much of this as they will clean up nicely in 15-20 minutes, four or five times a day. Do not let the bird out. It will then only eat and sleep and gain a pound of white, juicy, tender meat in 10 days. Fast the bird for 24 hours (giving only water) before killing. Dress and clean and hang head downwards in a cool place for 18 hours before putting it into the pot to cook. Try this method and see if your chicken dinners do not unprove! Even ordinary country fowls if kept and clean fed for ten days will make much better table birds than are served ordinarily.

I purchased some hens from you that were supposed to be laying but I have not had an egg since the birds arrived a week ago. What is the trouble?

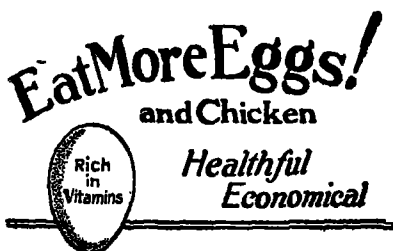
This is exactly what can be expected when laying hens are suddenly moved or shipped. They are even likely to go into a moult and may not lay an egg, or at best very few, for 2 weeks or a month. The lesson for the poultry farmer to learn from this is that birds in full lay should be fed and cared for regularly and moved or disturbed as little as possible. An 'egg laying machine' in heavy production is as delicate an instrument as a piano. Both are thrown out of tune by rough handling.

What vitamins are essential for fowls and what does each supply?

Vitamin A is necessary for growth and to prevent infections of the eye and respiratory tract. Green feeds will supply this. Vitamin B maintains the appetite and a normal condition of the intestinal tract and prevents nervous diseases. Seeds of various grains and green

feeds supply this in sufficient amount as a general rule. Vitamin D is primarily necessary for bone growth to prevent Rickets. Direct sunshine is the cheapest source of this vitamin. It is also supplied by cod or shark liver oil. Vitamin E is essential for reproduction. Feeding sprouted grains in the breeding season, is the best method of furnishing this need. Riboflavin, the poultryman's vitamin G, is necessary for hatchability of eggs. To improve hatching results, feed liver, butter-milk and green feed during the breeding season.

IV. EGGS



What is the comparative consumption of eggs in various countries?

Consulting reports from various countries, which may not all be for the same year, we find the following as an approximate estimate of the consumption of eggs per person per year :—

Irish Free State	...	283
Canada	...	260
United States of America	...	236
United Kingdom	...	158
Germany	...	114
India		70

It will be seen from this that India has not yet begun to touch the fringe of utilizing this most valuable food element. We urgently need an 'Eat More Eggs; Healthful-Nourishing' campaign in India!

What is the approximate consumption of eggs per capita by Provinces in India?

Travancore	... 21.6
Baluchistan	... 19.7
Bombay	... 15.3
Nizam's Dominions	... 15.0
Mysore	... 11.0
Madras	... 10.7
United Provinces	... 8.5
Punjab	... 7.6
Bihar and Orissa	... 5.8
Bengal	... 5.4
Central Provinces	... 4.4
Assam	... 3.5
Average for all India	... 7.8

How is an egg formed?

This is a very complex but most interesting procedure. A large number of minute yolk sacs (ovules) are contained in the ovary of the hen. It has been found that their total number approximate the potential number of eggs a hen can lay in her life time. As the hen becomes sexually mature some of these yolk sacs begin to develop and reach maturity in about fourteen days. When fully ripened the yolk sac ruptures, allowing the yolk to enter the funnel-shaped oviduct. If the hen has been mated, the sperm cell here enters the small germinal

disk appearing as a light coloured spot on the surface of the yolk. The yolk then passes slowly down through the albumen-secreting region into the uterus where the shell is added. The fully-formed egg is then ready to be laid. The normal time for the formation of the egg after the yolk leaves the ovary is estimated to be from 18 to 26 hours. It can be seen from this that mating or not mating a hen has no connection with the formation of the egg.

What is the composition or analysis of an egg ?

Roughly speaking, an egg is made up of :—

White	... 58%
Yolk	... 32%
Shell	... 10%

The analysis of each being :—

	Yolk %	White %	Whole egg %
Water	... 49	87	66·7
Fat	... 32	Trace only	8·9
Protein	... 17.	12	12·2
Minerals or Shell.	2	1	12·2
Total	... 100	100	100

This varies with conditions, the fat content for example differing somewhat according to the feed given.

What is the hatching period for eggs from various fowls?

Hen	... 21 days	Guinea fowl	... 25 days.
Duck	... 28 „	Goose	... 30 „
Turkey	... 28 „	Pea-fowl	... 28 „

Can the sex of an egg be determined ?

It is a common theory that round eggs are pullets and long ones cockerels. Extensive experiments have proved this to be false. A number of sex determining appliances have been placed on the market by 'Quacks', all of which reliable authorities have proved to be useless. So do not waste your time or money on any of these. No device has been found to perform this very desirable function. We must look to other means for the selection of pullets and cockerels. (*Note.*—'Sex-linkage', page 20 and 'Sexing', page 65.)

Is it true that hens will lay eggs without a cock bird in the pen ?

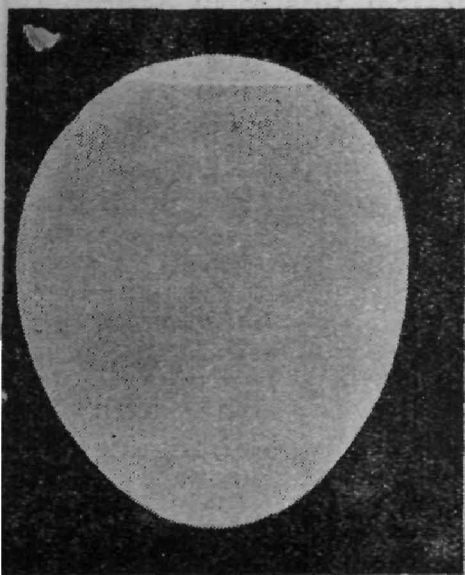
Yes, the cock has absolutely no influence on the egg laying of the hens. Thousands of poultry farms, operating only for table egg production, never have a male on the place. Hens, as a matter of fact, will often do better if not constantly worried by the attention of Mr. Cock. Such eggs however are useful for table purposes only and being infertile, will not hatch chicks. If eggs for incubation and hatching are wanted, male birds must be used.

How soon does a freshly-laid egg deteriorate ?

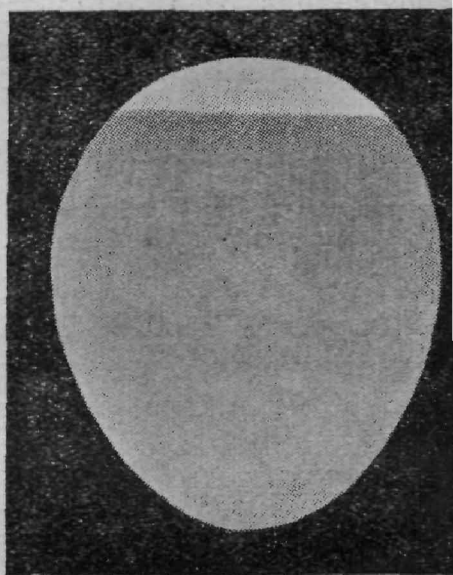
That depends a great deal on the conditions under which it is kept. For example, in America, it was found that new-laid eggs fell into a lower grade upon being held 3 days at 98·6 degrees F. in 23 days at 61 degrees F. and only after 100 days at 37·6 degree F. Great care therefore should be taken to store eggs in as cool a place as possible after being lain.

What is the process known as 'Candling'?

This consists of holding the egg before a strong light to test its quality as well as air space. This is best accomplished in a dark room. An electric light, petromax or even a strong kerosene lantern placed in a paper or wooden box can be used. A small opening one inch

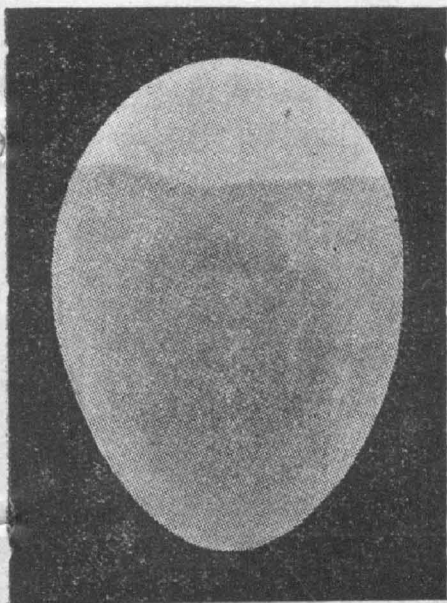


FRESH EGG

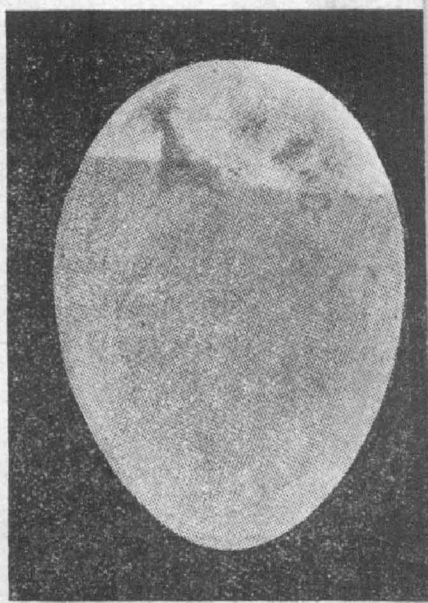


EGG SLIGHTLY EVAPORATED

in diameter should be made, before which the egg is held with the air space upward. As the egg is placed before the light it should be given a quick turn to the right and again to the left to start the contents of the egg whirling, revealing the density of the white and any meat spots, developing embryos, blood clots or any other abnormalities. The quality of the shell can also be observed.



STALE EGG



ADDLED EGG

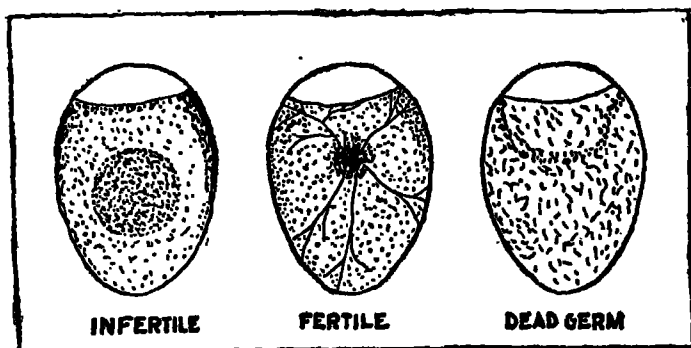
An experienced tester can handle from 700 to 1,800 eggs an hour. This is the most reliable method of testing eggs for quality and freshness.

What is the water method of testing eggs and what does it reveal ?

Placing eggs in water shows the amount of evaporation that has taken place, indicating to some extent, the age of the egg. A newly-laid egg will lie nearly flat in a pan of water. As evaporation takes place through the porous shell of the egg, the air space will enlarge, causing the egg to tip and even rise to the surface of the water. This is a common test but does not show the interior quality of the egg as does candling with a light.

Should eggs be tested while being incubated ?

Yes, eggs are usually tested on the 7th and 14th days to throw out infertiles and dead germs. This makes



APPEARANCE OF EGGS AFTER 7 DAYS OF INCUBATION

more room available and also prevents good eggs from being contaminated by odours coming from the bad eggs. Eggs thus discarded can also be hard-boiled and fed to small chicks. In testing before a strong light, as is done in candling, an infertile egg is clear like a fresh egg, whereas a fertile one on the 7th day will show a dark spot with red, web-like veins radiating in all directions. A dead germ egg usually has a bright stationary red circle or a dark mass adhering to the shell membrane on one side.

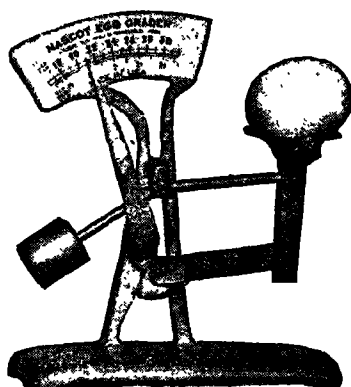
(Note diagram above.)

What is the official 'Agmark' egg standard ?

The standard grading of eggs under the Agricultural Produce Grading and Marketing Act, 1937, known as 'Agmark' have the following grades by weight:—

Extra Special	...	2	oz. and above
Special	...	1 $\frac{7}{8}$	oz.

Grade	A	...	$1\frac{3}{4}$	oz.
Grade	B	...	$1\frac{1}{2}$	oz.
Grade	C	...	$1\frac{1}{4}$	oz.
Grade	D less than	...	$1\frac{1}{4}$	oz.



EGG SCALE FOR GRADING OF EGGS

The Mission Poultry Farm, Katpadi, is using this grading standard in marketing its eggs. It is also helping villager's in the locality by marketing their eggs. This department marketed 44,825 eggs in the month of December (1942).

Does hot weather, such as we have on the plains in India, have any effect on the size of eggs ?

Experiments indicate that when the temperature is above 85 degrees F. the egg weight will be reduced from 10% to 20%. Our experience at Katpadi coincides with this. We have found that keeping eggs up to the 2 oz. standard is very difficult especially in summer. I have often felt that we should be satisfied with

a $1\frac{1}{2}$ oz. egg which is a good size, grading 'A' according to the 'Agmark' standard set by the official Government Marketing agencies. On the hills, in cooler climates and during winter months, a 2 oz. egg is possible.

What are some methods used for the preservation of eggs?

In Western countries, cold storage is universally used where eggs are collected as soon after laying as possible, put into refrigeration and held at 29 or 30 degrees F. temperature. A few of the larger cities in India have such facilities charging a fee of about 0-1-3 for a basket of 400 eggs per day. This is not used extensively, however.

In villages eggs are sometimes covered with paddy husk or grains and stored in pots. They are at times kept covered with neem (margosa) leaves or in salt. These methods are good in so far as they prevent rapid evaporation.

A water glass solution of soluble sodium silicate has also been used satisfactorily in India. A measure of water glass is well mixed with nine measures of boiling water. When cold, it is put into an earthenware jar (Parry & Co.) and fresh, preferably infertile eggs, immersed at least two inches, small end down. Before using, wash off the water glass and if used for boiling, prick the shells in several places to prevent cracking.

Eggs may also be 'processed' by dipping them in hot oil at 235 to 260 degrees F. temperature for a short time. This reduces the evaporation of the egg contents thus improving the keeping quality. The flavour of the eggs is not impaired by this process. The eggs should be

processed the same day as laid for best results. The oil coating should be washed off before the eggs are to be used. This is a cheaper method than using water glass and can be recommended for family use.

What are dried eggs and for what purposes can they be used?

The drying of eggs has been an extensive commercial business in China for many years. The water content of the egg is evaporated making a flaky powder which is easy to transport and one which does not deteriorate: About 50 good-sized eggs will make one lb. of dried product. Dried whole eggs or separately dried yolks and whites are used extensively by bakers and confectioners. One pound of dried egg is dissolved and thoroughly mixed with $2\frac{1}{2}$ to 3 pints of warm water to restore it to its original consistency. We have dried eggs successfully and find the product very satisfactory for cooking and baking purposes. In the hot summer, eggs can be dried in pans in the hot sun in from 48 to 72 hours. Pans should be coated with vegetable oil to facilitate easy removal of the dried material.

The dehydration of fruits, vegetables, eggs and meat is at present being done in enormous quantities to provide food for troops.

V. DISEASES AND TREATMENT

‘Kindly tell me all about diseases of fowls and how to treat them.’

This is a very common request addressed to our poultry farm but is as unfair to ask or impossible to answer as if addressed to the D. M. O. concerning the

diseases of man. Veterinarians are trained to look after fowls and animals as Doctors are to prescribe treatment for ourselves. We do not claim to be professionals in the treatment of fowls but we are glad to share some of our practical experiences of the past twenty odd years in India.

First of all may I say that we do as little doping and doctoring as possible. My Professor of Poultry Husbandry at Iowa State College (Ames), U.S.A., prescribed the ax as the best medicine with which to treat sick fowls, I agree with his advice. If one has a very valuable bird then, of course, treatment is worth while but not for the ordinary fowl.

Prevention of disease is our watch-word! Good feed; regular care; cleanliness in feeding and housing; isolation of sick fowls; quarantine incoming stock; control external and internal parasites—observe these seven conditions and diseases of fowls need not worry you too much. Our poultry plant with from 300 to 1,000 birds for more than 20 years has been remarkably free from the devastating epidemics and diseases reported by many others who attempt to raise fowls in this country.

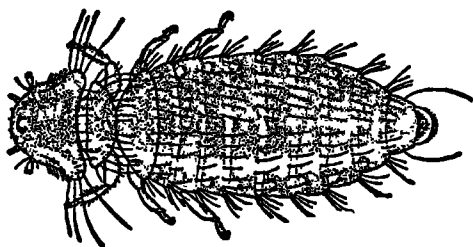
What are the most common diseases I should be on guard against?

Ranikhet disease, chicken-pox, colds and roup, infectious bronchitis, and others caused by worms, ticks, lice and mites. These are the most important factors to watch out for with a vigilant eye. There are many complications arising from the above but few others of major importance in our experience. India can consider itself fortunate that to date such ravaging diseases

as tuberculosis, bacillary white diarrhoea, and fowl plague have caused little trouble compared with the havoc caused in some countries.

What can I do to control lice ?

We have found that the simplest method to control lice in our large breeding plant is to dip all the birds twice a year in a solution of 1 gallon of warm rain water to 1 oz. each of sodium flouride, flowers of sulphur and laundry soap. Sodium flouride is more effective than sulphur but if the former is not readily obtainable, double the quantity of sulphur as a



BODY LOUSE (Much enlarged)

second best measure of protection. A few pinches of sodium flouride may also be dusted onto the bird. Coarse tobacco waste, powdered and mixed with dry earth and placed in the pen where the birds can dust themselves will also control this parasite to a large extent. Or make a very concentrated solution of thoroughly boiled tobacco stems and paint this on the perches 15 minutes before the fowls roost for the night. The strong fumes kill the lice. Repeat the application after 10 days.

Fowls must be kept free from the annoyance and danger caused by these biting insects. As it is very

easily controlled, there should be no excuse for having lice on your fowls.

What is chicken-pox ?

Chicken-pox, also known as fowl-pox, avian diphtheria, canker mouth or sore head is an infectious disease of the blood. It occurs in different forms or a combination of them as follows :—

1. *Skin or nodular type.* Small blister-like areas appear on the comb, face and wattles which become greyish enlargements. This is the milder type and the scabs will usually disappear in four to six weeks if no other complications occur.

2. *Diphtheric or canker type.* This is much more serious and appears as yellowish canker-like sores on the mucous membrane of the mouth, throat and upper windpipe. This is sometimes called avian diphtheria.

3. *The eye type.* Sometimes the disease attacks the eyes and eyelids particularly, and is manifested by redness and swelling, then a watery and later a yellowish discharge from the eye. The eye may eventually be completely destroyed and the bird become useless. We consider this one of the most common poultry diseases in India as also the one taking even a larger toll of life than does 'The Angel of Death' (Ranikhet disease) although it is less spectacular. Many village people take it for granted like itch, scabbies or the proverbial fleas on a dog. But its seriousness must not be under-estimated. The disease is particularly virulent with the approach of the hot weather in March and April. It is also most serious for young chickens under two months of age. Older fowls usually do not suffer too badly but few small

chicks are able to resist a virulent attack. Our advice is not to attempt to raise small chicks during this season.

Can fowls be immunized against chicken-pox ?

Immunity against fowl-pox has been used successfully for many years. Vaccine can be had from the Government Veterinary Department which has supplied the material and vaccinated our entire flock free of charge on several occasions.

In America successful experiments have been made in vaccinating day-old and young chicks. Following their example we used it on 2,000 baby chicks at our Farm at Katpadi with fairly good results. The chicks reacted to the treatment but the disease occurred in a rather mild form. The shock of the treatment did lower the vitality of the chickens so that I would not recommend it to a person who can control the disease successfully with a tonic and general thriftiness.

A few years ago, before the Veterinary department supplied us, we made our own vaccine as follows :—

One part powdered fowl-pox scab secured from infected birds. This was mixed with 250 parts of a diluent made of :—

1. 40 per cent glycerine.
2. 60 per cent saturated saline solution.

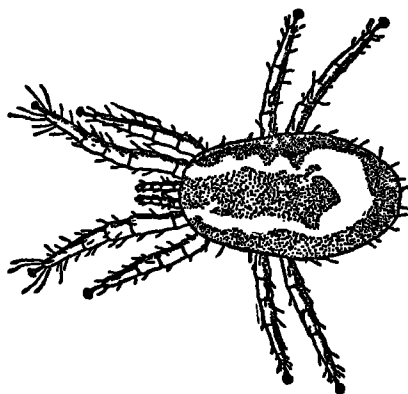
A small patch of fluff was plucked from the breast of the chick and slightly scarified to obtain a successful infection and uniform reaction. The vaccine was applied to the skin and feather follicles with a stiff brush. The chicks were isolated in a dark room for a day or two following the treatment to prevent cannibalism by

chicks will clean up in a half hour should be given. This tonic should be given regularly on the same day every week beginning from January 15 and continuing until the danger of the disease is over, which we have found to be by about the middle of April. This tonic will never do any harm and may prove useful. We recommend it chiefly for chicks under two months of age although we feed it more or less as a matter of routine to all our growing stock in the early months of the year.

The drugs can be obtained at any good Chemist but we have found that it is considerably cheaper to buy the raw ginger and grind it ourselves. This is not as pure as that coming from the Chemist's stock room but serves our purpose equally well.

What are 'Mites'?

Many people confuse these with lice but the two are very dissimilar. The louse is a biting insect while the



MITE (Much enlarged)

mite is a sucking insect and one which cannot be poisoned but must be killed by suffocation. Mites are much

more difficult to control than lice. Lice live on the bird itself. Mites hide in cracks and holes in the perches or building during the day and attack the fowls at night by sucking their blood, often to the extent of actually killing the bird. If the poultry house is badly infested the fowls will be greatly emaciated and will not thrive. The presence of these pests may not be suspected until the birds begin to droop and show lack of vigour.

All perches, roosts, nest boxes and loose material should be removed at least once a month for inspection and painted with kerosene or thinned crude oil. Kerosene emulsion made up as follows and thoroughly sprayed in the shed once a month will control these blood-suckers :

Take 8 oz. of soft soap and dissolve it in one gallon of boiling water. Remove this mixture from the fire and slowly add one gallon of kerosene, stirring the same vigorously all the time, and continuing until the oil and the soapy water are thoroughly emulsified. These 2 gallons are then known as a 'stock solution' to which ten gallons of rain water should be added before spraying in the poultry house. Hard water will not serve the purpose because it will cause the oil and the soapy water to separate making the solution ineffective and useless. They must be thoroughly and effectively mixed or emulsified.

We go through all our sheds once a month with a blow-torch to 'burn 'em up' in their hiding places. It is very important that the poultry house be light, well ventilated and free from dampness because mites thrive in damp, dark, dirty places.

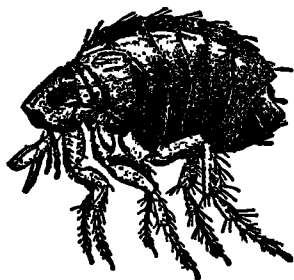
My hens have developed large growths on their feet and legs and are going lame. Is there anything I can do for it ?

This is a very common occurrence in India. It is caused by a very small mite, a blood-sucking insect, that has lodged itself under the scales of the fowl's legs (scaley leg mite). This besides causing the fowl a great deal of annoyance, spreads through the flock very quickly.

The fowl's legs can be dipped up to the hock in a small tin of kerosene for ten seconds every four days until the scales fall off. Tar smeared on the legs will also cure the trouble. This condition though very easily cured, is still very prevalent among fowls in India.

My birds have black rings around their eyes which seem to be poochles which I cannot remove. What can I do for it ?

You are being bothered with the 'stick-tight' flea.



THE STICKTIGHT FLEA,
(Much enlarged)

which I have seen in large numbers in some flocks. We have never been bothered with them at Katpadi. These fleas breed in dusty and filthy places as a rule and also on rats, cats and dogs. They will be found sticking in black clusters on the comb and wattles and around the eyes. Young chicks are usually more subject to attack

than grown birds. As the name indicates, they adhere so tightly that it is almost impossible to remove them. Large numbers may annoy and emaciate the host so as

to retard growth and egg-laying and may even prove fatal to the bird in time.

First of all, clean up the premises, removing all filth and dust, in which they breed in large numbers. Smear with sulphur ointment on comb, wattles and around the eyes. One part of kerosene well mixed with three parts of lard can also be used satisfactorily. Care must be taken that the eyes of the fowl are protected from the application.

What about the fowl tick?

The seriousness of the tick cannot be over-emphasized. Losses due to this pest far exceed even that caused by chicken-pox or fowl pest. Of this I have no doubt. If your birds are not doing well, look droopy, listless, inactive and fail to grow properly or lay well, you have good reasons to suspect that the tick is sucking the life out of the bird and causing it to suffer from 'tick fever'.

The tick, like the mite, lives in the fowl house or run during the day and attacks the birds at night by sucking blood. Ticks are about $\frac{1}{4}$ inch long, quite similar to the beg-bug. They live in cracks and crevices. If a shed or run is once badly infested a long war will have to be waged to bring it under control. Therefore beware and keep Mr. Tick at long range! Practise constant vigilance!

In pucca brick or zinc sheet houses, it is a good practice to light a good bonfire of straw and twigs occasionally. The blow-torch is also very good. All perches and wooden materials should be well tarred to avoid hiding and breeding places. All houses should be

thoroughly cleaned and disinfected from time to time. Tick proof perches can be used but this is hardly practical for the average poultry keeper. Birds suffering from tick fever in the early stages can be injected with Soamin or Salvarsan but that too is not a practical solution. Therefore, and I cannot emphasise this too strongly, prevent an attack! Practise cleanliness! Disinfect well occasionally and this pest can easily be kept under control. Do not take a thing for granted! Be on your guard constantly!

What is 'Raniket Disease'?

This is very acute disease that has been common and endemic all over India for the past fifteen years. It has taken, and is taking birds by the thousands, possibly millions every year. It has been called by various names such as 'Doyle's disease', 'Pseudo-fowl pest', 'European fowl pest' and 'Angel of Death'. This disease is probably the greatest obstacle to the promotion of the poultry industry in India today. Hundreds of people have had their enthusiasm dampened by having had their entire flock wiped out in a few days. The Veterinary Department are conducting extensive research work on the disease, but no specific cure is available as yet, although hopes are held out that this may be true in the not too distant future.

The disease affects chickens, turkeys, geese, crows and other birds. The infective agent is known to be a filtrable virus present in the blood. The disease is characterized by its extremely infectious nature, rapidly progressing course and high mortality. Birds affected soon have an irregular gait, darkening of combs and

wattles, yellowish-green droppings and laboured breathing. Death may result within a few hours or usually within 2 to 5 days. Village people have learned to diagnose the disease. Seeing their fowls affected, they immediately carry them to a nearby shandy and sell them for a few annas, thereby spreading the disease, making it almost endemic in the country. There is no cure for the disease although many and varied claims have been made and tried. Prevention is the only solution. Keep country fowls off the place! Isolate birds when the disease is known to be near!

Have you ever had fowl pest at the Mission Poultry Farm and, if so, what treatment did you give?

Yes, we have had 2 outbreaks during the past 7 years, both caused by bringing bazaar fowls onto the place by workers contrary to strict orders. Each time, as soon as discovered, all birds in affected pens were ruthlessly killed and burned by me personally. The remaining fowls were quarantined. Many of the most valuable birds were isolated individually. The attendant disinfected his hands and feet thoroughly before going from one pen to another or from bird to bird. In the case of each outbreak the disease was thus brought under complete control without the loss of another fowl. The quarantine regulations were continued for two weeks. After the yards and pens had been well cleaned and disinfected the birds were again released. The infected runs were ploughed up and a green crop raised before being used again.

These experiences have proven to us that the disease is not too difficult to control if direct contact with

outside fowls is avoided. Outside of these two experiences caused by carelessness, we have had no difficulty from this disease nor fear of it. All birds coming onto our place are strictly isolated for 10 days and no person resident on our compound is permitted to bring fowls onto our property except in a pot ready to cook.

Are fowls subject to worm infestation ?

Yes, very much so. It probably is true that very few fowls are ever entirely free from worms, especially when kept in yards and runs where fowls have been kept for years. Such places are usually badly contaminated. Small chickens, under 3 or 4 months of age, usually suffer most from these parasites. It, therefore, is a good policy to raise young chicks on ground where older fowls have not been kept. We raise our chicks on wire netting in battery brooders for the first month and then move them into our guava and orange gardens on land that is frequently dug up and watered in order to control worms in the growing stock.

Raw onions fed once a week is also a good way to control worms, especially in young chicks. Adding 2 per cent by weight of tobacco dust to the mash is also a good preventive.

One teaspoonful of oil of chenopodium for every 12 birds, mixed with the wet mash, is a good single dose treatment for roundworms.

It is not advisable to upset the laying or breeding pens by drastic worm treatment. Therefore, laying or breeding pens should be given treatment at the beginning of the season.

What can I do for colds ?

First of all look for the cause. Do not allow birds to run in the rain and get wet unnecessarily, especially in cold, damp-weather. Overcrowding is also a common cause that must be avoided. If birds are in a run down condition due to worms or parasites this condition is aggravated. If fowls are healthy and thrifty, colds are not contracted as a rule. Look to the ventilation and dryness of the shed. A common cold, though not serious in itself, may lead to roup and later bronchitis. It manifests itself in sneezing, a running nose, difficult breathing and a rattling sound in the throat as the disease progresses. If the bird is not particularly valuable, better have a chicken dinner. If worth doctoring:—1. Isolate. 2. Feed soft feeds (honey is also very good). 3. Disinfect water. 4. Give 3 grains quinine twice daily, and 5. Give inhalations twice daily by adding a few drops of eucalyptus and turpentine to boiling water. This will help to break up the congested condition.

What is bumble-foot ?

Bumble-foot is the term applied to a swelling of the pad of the fowl's foot. It may be a hereditary condition or the result of a bruise that has become infected. If perches are too high this condition may result. Sharp stones or glass in the run may be responsible for the trouble. This condition is very common in India, particularly among White Leghorns.

A small, hard spot or core in the ball of the foot, like a corn is the first symptom. If this becomes swollen or inflamed it should be painted with iodine which may

possibly obviate further trouble. If the whole foot becomes infected and an abscess forms, the same should be soaked in hot water to bring it to a head and then lanced and the contents squeezed and washed out. Insert some iodine crystals in the wound. Bandage up the foot and dress at 2-day intervals.

If the condition recurs it is likely to be hereditary and the bird should be destroyed or at least removed from the breeding pen.

‘ Please send me a cock which does not crow too frequently and is of good habits and he must be a very showy bird.’

‘ Your order for a “showy bird ” is being filled, we hope to your satisfaction. We are flattered that you class us with Luther Burbank the “ Plant Wizard ”. We know how to “ debeat ” goats but have not yet learned to decrow cocks. If you confine the cock in a low crate so that he cannot raise his head too high, his crowing habits can be regulated. We have not yet turned our hand to teaching our birds good habits but I hope the cock we are sending you will be amenable to training.’

What is ‘ Dubbing ? ’

Some breeds, particularly the larger strains of White Leghorn, often develop such large combs and wattles as they get older, that these interfere with the movements of the bird in finding feed and mating. In such cases the entire comb should be removed with a sharp knife, cutting within an inch of the head. The wattles too should be trimmed back about an inch because they tend to become larger after the comb is removed and may

carefully and should not lead to bleeding. Give free range, feed plenty of green feed, isolate them lest they teach others, or if necessary kill the offenders.

Have you found that villagers have been successful in preventing diseases in the flocks built up with your cooperation?

My answer has to be a very sorrowful 'No'. Losses among the fowl population in the villages where we are working have been colossal. But, I do not hold this as a brief against the possibility of success with poultry in India. Ignorance, superstition, apathy toward the project; the spirit of fatalism; communal village living conditions; lack of cooperative spirit; insanitation; poor feeding; failure to observe most basic principles laid down to insure success; pests; parasites; thieving; just plain deviltry and jealousy—it's a long list of difficulties that have to be overcome, *but* not insurmountable I am fully assured. 'Rome was not built in a day' nor will the villages of India be reconstructed in a decade but we struggle on confident that progress is being made. I would list unsympathetic, ill-informed critics clamouring for early and appreciable results as the greatest hazard to this and all forms of rural development.

VI. HOUSING AND MANAGEMENT

What are some contributing features of a successful poultry project?

The degree in which the following factors are secured will largely determine success or failure:

1. *Low mortality*.—Every chick or chicken that dies is, of course, a dead loss. These must be minimized.

Some losses are inevitable but too many projects fail because these are excessive and are accepted in too complacent an attitude.

2. *High egg yield*.—Note question No. 4 of this chapter to see its importance.

3. *Low overhead cost*.—Excessive cost of buildings or their repair; feed bills too high; labour cost out of proportion to income secured.

4. *Size of project*.—This is frequently too small to make it a paying concern. In America it is considered that one man giving full time should care for 1,500 fowls. This gives something of an idea of what is meant by 'size of project'. We, of course, do not have all the modern conveniences or facilities for effective work in India, but keeping less than 25 or 50 hens is scarcely worthy of being called 'going in for poultry farming'.

How can I best tell whether everything is going well with my flock?

Do not leave the entire job to a servant and expect that things will go well. If a servant is employed, it will be a good practice to schedule yourself to get out personally and open the doors one morning a week. See if the birds look thrifty and active. Pick up one or two and see if they are losing weight or getting too fat and, if so, regulate the feed accordingly, giving more grain if too thin and less if too fat. Look for lice and fleas. Examine the roosts and shed for mites and ticks. Are colds developing? Any signs of bumble-foot? Scaley legs? Are the droppings of the right consistency? Any diarrhoea? Constipation?

Spot the bird if you see anything abnormal. Do not leave things to chance and when troubles reach an advanced state throw up your hands and say, 'Aiyo, Aiyo' and 'blow up' the boy in charge. Every bird should leave the shed with a rush and a flutter, eager to get at the day's job of producing eggs or 'growing like weeds'. Examine and check up on the feed and utensils. Are things kept clean and sanitary? Is egg-production up to at least a 50% basis? If not, what is wrong? A routine check-up like this, either on yourself or on a servant once a week is very essential. Do this regularly and it will save you time and effort in doping and doctoring birds which at best is a waste of time with chickens.

How long should a hen be kept for egg-production ordinarily ?

Large egg farms in America plan to cull out 50% of their pullets at the end of the first laying year, keeping about half for the second and none into the third year. Hens normally lay the most eggs during the first 12 months of production and then gradually decline. Only very valuable breeders should ever be kept for more than 2 years. Birds may lay even up to 7 years of age but the eggs will be few and often infertile as well. Of recent years it has been proven that vitality in fowls is closely linked with longevity. Poultrymen, therefore, breed for this characteristic. One breeder had a W. Leghorn hen that laid 1,156 eggs in 7 years. But, for ordinary egg-production keep only pullets or yearling fowls because good hens reduce about 30 eggs a year in laying capacity.

What is the correlation between cost of production and egg-laying capacity?

I am not in a position to answer this for India but I have some figures that were gathered in America from various farms where accurate records were kept which show the following very interesting results:—

Average No. of eggs laid during the year	Lbs. of feed required for each dozen eggs produced	Profit per year on the flock
100	8	\$ 225
150	7	\$ 511
175	6	\$ 1,378
200	5	\$ 1,810

This shows the value of operating a well-managed poultry farm compared with conducting a poorly managed project. High egg-production means cheaper costs in producing eggs with relatively greater profits.

What kind of fowl house is best for South India?

The wild jungle fowl roosts in the branches of trees. This is the ideal house but hardly practicable for domesticated fowls. However, it is best to try and imitate it so far as possible observing:—

1. *Light*.—Provide as much light as possible because mites, ticks and fleas all breed best in dark, damp places. Sunlight is the best and cheapest disinfectant in the world. Let us use it where it is so liberally available in India.

2. *Ventilation*.—Fowls require more fresh air than any other animal because their body temperature is high. They do not perspire or pass urine to void liquid waste products like other animals but have to pass off

all surplus moisture through respiration. The fowl house should always be dry and have enough ventilation to avoid a stuffy smell.

3. *Adequate space is required.*—In cold countries the cost of building is very great because fowls must be protected against the cold. As this is not necessary in India, cheap construction can be used and overcrowding, which is a direct cause for colds, roup and other ailments avoided. 3 sq. ft. of floor space per adult fowl is necessary.

4. *Safety.*—Birds must be protected against thieves, jackals, wild-cats, mongooses and other predatory animals. But a good watch-dog is a better investment than an expensive shed.

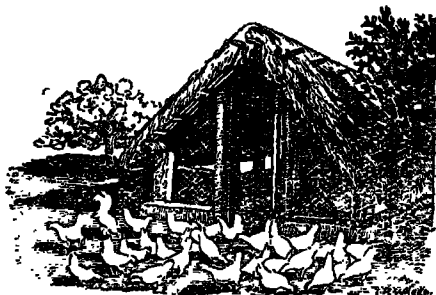
5. *Convenience.*—The shed should be built so that it can easily be cleaned daily. Roosts and nest boxes should be removable for occasional cleaning and disinfecting.

The village type of fowl prison violates all the above principles except that of safety:—dark, damp, no ventilation, crowded, inconvenient—a fine place to inflict capital punishment but no place for a busy, happy, profitable working hen!

What type of fowl house have you found best ?

We have experimented with many and varied types of houses and have now come to the exclusive use of a thatched, gable-roof type shed, 16 feet long by 10 feet wide, facing South with a wall on the North end and fine mesh wire netting on the other three sides. Stone pillars 7 feet above floor level support the roof in the centre. The sides are 3 feet above ground level giving a

good pitch to the roof. A simple 18" foundation prevents wild-cats or jackals from digging underneath. On this a 9" stub wall is built on 3 sides, anchoring the wire netting used on the sides and front. The door on the South end is 6' x 2' 4" making easy entrance possible. Perches, nest boxes, feed trays, hoppers and water pans



A CHEAP, SATISFACTORY POULTRY SHED

can all be arranged inside the building. This shed, costing about Rs. 50, accommodates 50 adult fowls or 100 young birds. They are relatively cool in summer, warm in winter, well ventilated, dry, convenient, cheap and durable. All the interior fittings are removable. Use a blow torch occasionally to control ticks, mites and fleas.

What type of poultry shed would you recommend for me if I keep from 12 to 25 fowls ?

There are two types of shed that may best be constructed without too much expense.

A. *The gable roof type.*—This type of shed has been explained in detail in answer to the last question.

A shed of this kind made 6' wide and 12' long will be large enough for 25 fowls. The centre ridge should be 5' 6" high and the lower side 2' 6" to get a good slope for a thatched roof.

B. *Lean-to type*.—This kind of a shed can be built onto the verandah or side of the house quite satisfactorily.

How best can perches be provided ?

Chickens should be trained to roost on perches as soon as possible rather than sleep on the floor. For adult fowls perches should be made out of material 3" to 4" wide, 1" thick and placed 2' above the floor. These should be 15" apart and provide roosting space of from 7" to 10" per fowl depending on breed and size. Perches should be thoroughly tarred and made easily removable for exposing to the hot sun occasionally.

What is the best method of building runs for fowls that must always be confined ?

The best method is to have two separate runs, one on each side of the shed. These runs can be used alternately, one being dug up and planted or sown while the other is being used for the birds. By doing this, worms and parasites can be controlled more effectively. If a poultry run is never ploughed or dug up, it becomes very heavily infested with various organisms.

It is also a good plan to have fruit trees or shrubs in the run to provide shade for the fowls, who, in turn, fertilize the trees giving the owner a double income from the land. Fowls and fruit trees thus compliment each other, making an ideal combination.

When are fowls supposed to moult in India?

This is still a question I do not feel entirely competent to answer. In colder countries it is a common practice to cull in the fall of the year and to consider that the late moulter and one that keeps up production even when dropping its feathers is by and large the best bird to keep. But in India birds seem to be more or less in a continuous process of changing their plumage. In a general way, however, our experience leads us to believe that birds moulting in November, December and January are the poor producers and that those going on filling the egg basket through the cold season and until the approach of the hot weather are the more productive ones. Of course, any bird, good, bad or indifferent, can be thrown into an early moult by bad or careless management. The rapidity of moulting too is an important factor to consider.

When should I cull my flock ?

This should be a continual process. Constant and rigorous selection is one of the vital points to observe in operating a successful poultry project, be it for a dozen hens or a thousand-bird flock. Chickens should be watched constantly from the day they are hatched. Chicks that do not grow or develop well and those that are weak, deformed or lacking in desirable characteristics should be culled ruthlessly. It never pays to keep any but the very best if the quality and standard of a breeding or egg-laying project is to be really first class. It is a good practice to go over the flock once a month and eliminate birds that are not up to the mark. Never keep the ' loafers ' even for a day if you can spot them. The

successful poultryman keeps his eyes and ears and all his *seven* senses on the job all the time to eliminate waste and unprofitable individuals. Rapid growth; early maturity; the first hen out of the shed in the morning and the last one to go in at night; the active, busy, singing individual and the one with straggly plumage; the late moulter—these are some points to note.

The trapnest is a great help in selecting the best individuals for egg size and numbers but not absolutely essential, except for the expert breeder, if the attendant will note small points day by day and use some system of marking the best individuals. Culling according to the moult is a common practice. The good layer moults late and quickly. The nicely feathered bird is fine for a beauty contest but not to fill the egg basket. Cull often, and rigorously! Few hens should be kept for more than two years. Keep young stock by and large as they are the most profitable producers.

What can I do to break up a broody hen?

All kinds of foolish and cruel methods are practised to prevent a hen from sitting. Hens are submerged in water and half drowned. Villagers at times starve a fowl or put a feather through its nose to make it uncomfortable. Such practices are cruel, inhuman and unnecessary.

As soon as a hen begins to show signs of broodiness she should be put into a crate with a slatted or wire bottom. She will then refuse to sit continuously and her broodiness will soon disappear. The bird should be well fed and cared for in which case she will not lose too much weight and strength and will soon be back on the job of

laying eggs instead of spending months to get back into production if she has been cruelly and ill treated. The setting instinct has been largely bred out of improved poultry since the introduction of the mechanical incubator.

How can I best mark my fowls ?

Various methods are adopted for this purpose notably :—

1. Coloured leg bands to differentiate pens or individual birds.

2. Toe punching of day-old chicks.

3. Numbered wing and leg bands: Bands are put in the wing of day-old chicks as a rule and the bird is later leg banded. This is used largely in trapnesting and pedigree work.

4. Tatooing: Birds can be tatooed in the web of the wing with indelible ink to give an identification mark for life. This method has been used to detect thieving.

I am sending over a basket of eggs. I understand that you can hatch these in your incubator. Please send the chicks through bearer.

Yes, we do hatch several thousand chicks every year by incubator, but we are not able to speed up Mother Nature as you suggest. An incubator is only an imitation of the natural process of hatching by hens and requires the usual 21 days. Incubators have been introduced in order to hatch chicks on a large scale and also because the broody instinct has largely been bred out

of the modern hen which we like to keep at work throughout the year in egg-production. We use incubators entirely for hatching our annual crop of two thousand or more chickens.

What are the 'Batteries' I read about in poultry journals?

Batteries are metal or wooden crates or compartments in which small chicks, laying hens or fattening fowls are confined continuously. The advantage is that thousands of birds can be kept in a relatively small space and fed, watered and cared for by one person. Battery floors are made of wire netting as a rule, through which the droppings fall into a removable tray, keeping the coop clean and sanitary. Food and water are provided outside so this too is kept clean. We introduced this system of brooding chicks into South India 20 years ago and have used it ever since with good success.

Laying batteries are used to confine laying hens. There are large egg-producing farms where thousands of hens are kept in small 2' x 2' cages all their lives, never setting foot on the ground or having free range.

Fattening batteries are used to confine birds for ten days or two weeks prior to killing as table birds. They are fed a fattening ration as mentioned on page 39 during this period.

What records should I keep of my poultry project?

One of the important means of improving the poultry enterprise is by keeping records and accounts. Most

successful poultrymen feel that it pays them large dividends to keep an account of their activities. It helps them to see how they stand in their business and to compare their efficiency with that of others. By keeping financial and production accounts, one can see where money comes from and where it is spent. A surprisingly small amount of time and book-keeping knowledge is required to keep a simple set of accounts.

There are three kinds of records that every poultry man should keep. These are: (1) An annual inventory (2) Daily receipts and expenses, (3) Daily egg-production. The inventory shows the size and condition of the business at a particular time. The record of receipts and expenses provides a means for determining the balance between the cost and the output of the business. This balance, with a consideration of inventory changes and estimates of the value of home-grown feeds, furnishes a complete statement of returns. To these records, to show the financial results of the poultry business for the year, should be added the estimated value of meat and eggs used in the home.

How should I keep an inventory ?

An inventory is very essential and should be taken at a given date, say January 1, every year. It should give an itemized list of all property and stock with the correct value assigned to each item including stock, equipment, feed and supplies. The difference in value of the inventory added to the cash account at the end of the year will show whether a profit has been made or a loss incurred.

The following is a sample :—

Items	Beginning of the year (January 1)		End of the year (December 31)	
	No.	Value	No.	Value
I. Stock—				
Hens	20	Rs. 26	25	Rs. 25
Cocks	2	6	6	9
Chicks	20	10	30	15
II. Equipment—				
Brooders	4	60	4	50
Poultry sheds	2	100	2	100
Feed tins	10	15	15	17
Egg-laying boxes	5	10	6	12
III. Feed on hand—				
Grain, lbs.	20	10	50	20
Mash ,,	25	10	50	20
Oyster shell	10	3	10	3
IV. Supplies—				
Medicines	...	10	...	15
Total	...	260	...	286

This shows that the value has increased by Rs. 26 during the year.

How can an account of receipts and expenses be recorded ?

This should be done regularly in some such diary form as follows :—

Month and date	Items	Quantity	Price per unit	Receipts	Ex- penses
January 1	Ragi ...	48 m	@ 8 m	RS A P	RS A P
March 6	Oyster shell ...	1 bag	@ 4	...	6-0-0
June 10	Eggs to Coop. Marketing So...	6 doz.	@ 8 as.	3- 0-0	...
August 1	Eggs to family in July ...	2 doz.	@ 8 as.	1- 0-0	...
September	1 cockerel for table ...	...	@ 12 as.	0-12-0	...
November	1 doz. setting eggs to Mr. X ...	1 doz.	@ 2 Rs	2- 0-0	...
December	Breeding trio to Mr. Y ...	3	@ 5 Rs	15-0-0	...
„	Paddy ...	48 m	@ 8 m	...	6-0-0
	Total ...	...	...	21-12-0	16-0-0

The above should then be summarized by months under :—

A. RECEIPTS

Month	Eggs		Poultry		Miscellaneous	Total
	Doz.	Value	No.	Value		
January ...	20	10/	6	8/	RS A P 2-0-0	RS A P 20-0-0
February and so on.	10	5/	8	6/	5-0-0	16-0-0
To December ...	20	10/	6	8/	6-0-0	24-0-0
Total ...	50	25/	20	22/	13-0-0	60-0-0

B. EXPENDITURES

Month	Feed		Coolie	Poultry		Equip- ment	Total
	lbs.	Value		No.	Value		
January ...	20	8/	6/	2	1/	2/	17-0-0
And so on to December ...	30	10/	6/	6	5/	3/	24-0-0
Total ...	50	18/	12/	8	6/	5/	Rs 41-0-0

If this is kept accurately, and by making entries regularly, a true record on the project is possible.

How can I keep an egg-production record?

The daily egg record is an excellent guide from which one can tell how things are going. Faulty management, poor feeding, bad weather, trouble from diseases or parasites any or all of these will be reflected in the daily egg record. A rough sheet tacked up in the fowl house from which the following summary can be made at the end of the month will be of great value:—

Days	January		February		And on to December	
	No. of hens	Eggs laid	No. of hens	Eggs laid	No. of hens	Eggs laid
1	20	10	23	12	26	10
2	21	9	20	10	26	14
3	22	11	20	9	26	14
and on to 31	23	13	24	13	24	10
Total ..						
Average No. of hens						
No. of eggs per hen per month						

Records to be of value, of course, must be kept accurately and studied to see how the project is going. All feed produced should be charged and all eggs or fowl used by the family charged in order to know how much profit the project is making.

Please give some specific examples where people have been able to earn an additional income from poultry.

We must remember that the average per capita income in India is variously estimated to be around Rs. 4 or Rs. 5 per month. An added income of even Re. 1 or Rs. 2 per month from poultry, though small, is no mean consideration for the average villager or family man in this country of exceedingly low income. We must not expect miracles from keeping a few birds. I list a few actual authentic cases from our records.

(a) A Higher Elementary grade teacher has been keeping a flock of R. I. Reds for several years. He is the Secretary of the local co-operative society through which eggs from the village are marketed twice a week. His flock has averaged 12 birds the past year, 10 of which he sold Rs. 6-8-0 worth of table and setting eggs and 8 birds for Rs. 12. His feed and other expenses were Rs. 5-10-0 leaving him a profit of Rs. 12-14-0 for the year.

(b) A young Christian farmer is employed by us as a grader in our Co-operative Egg Marketing Society on Rs. 10 per month. The family owns land in his village where he has his poultry plant in a large coconut grove. The past year he had an average of 30 W. I. birds in his flock. He sold Rs. 11-12-0 worth of eggs.